

EXHIBIT

34

1 UNITED STATES DISTRICT COURT
2 NORTHERN DISTRICT OF OHIO
3 EASTERN DIVISION
4 IN RE: NATIONAL :
5 PRESCRIPTION OPIATE :
6 LITIGATION, :
7 :
8 This document relates to: :
9 Track 8: Cobb County, :
10 Georgia :
11 Case No. 1:18-op-45817 :
12 :
13 COBB COUNTY, :
14 Plaintiff, :
15 :
16 v. :
17 :
18 PURDUE PHARMA, L.P., et :
19 al., :
20 Defendant. :
21 ----- :

22
23 VIDEOTAPE DEPOSITION OF:
24 KATHERINE KEYES, Ph.D.
NEW YORK, NEW YORK
TUESDAY, MAY 14, 2024

25 REPORTED BY:
26 SILVIA P. WAGE, CCR, CRR, RPR
27 JOB NO. 6692778

<p style="text-align: right;">Page 2</p> <p>1 2 3 MAY 14, 2024 4 9:11 a.m. 5 Videotape deposition of KATHERINE 6 KEYES, held at the offices of LIEFF 7 CABRASER HEIMANN & BERNSTEIN, 250 8 Hudson Street, 8th Floor, New York, New 9 York, pursuant to agreement before 10 SILVIA P. WAGE, a Certified Shorthand 11 Reporter, Certified Realtime Reporter, 12 Registered Professional Reporter, and 13 Notary Public for the States of New 14 Jersey, New York and Pennsylvania. 15 16 17 18 19 20 21 22 23 24</p>	<p style="text-align: right;">Page 4</p> <p>1 A P P E A R A N C E S (C O N T .) : 2 3 SIMMONS HANLY CONROY LAW FIRM 4 Attorneys for Cobb County 5 112 Madison Avenue, 7th Floor 6 New York, New York 10016 7 (212) 257-8482 8 Ssmokler@simmonsfirm.com 9 Jpollock@simmonsfirm.com 10 BY: SANFORD SMOKLER, ESQ. (VIA ZOOM) 11 BY: JO ANNA POLLACK, ESQ. (VIA ZOOM) 12 13 14 A L S O P R E S E N T : 15 16 COREY WAINAINA, VIDEOGRAPHER 17 18 SADIE TURNER, INTERN (VIA ZOOM) 19 LANIER 20 21 SOPHIA PRITCHETT, LAW CLERK (VIA ZOOM) 22 SIMONS HANLY CONROY 23 24 BILL HAMMOND (VIA ZOOM) 25</p>
<p style="text-align: right;">Page 3</p> <p>1 A P P E A R A N C E S : 2 3 LIEFF CABRASER HEIMANN & BERNSTEIN 4 Attorneys for Plaintiffs 5 250 Hudson Street 8th Floor 6 New York, New York 7 (212) 355-9500 8 Pdoamaral@lchb.com 9 Bcibulke@lchb.com 10 BY: PAULINA do AMARAL, ESQ. 11 BY: BRITT CIBULKE, ESQ. (VIA ZOOM) 12 13 14 LANIER LAW FIRM 15 Attorneys for Plaintiffs 16 535 Madison Avenue 17 New York, New York 10022 18 (212) 421-2800 19 Evan.Janush@LanierLawFirm.com 20 Leila.ayachi@LanierLawFirm.com 21 BY: EVAN JANUSH, ESQ. 22 BY: LEILA AYACHI, ESQ. 23 24 25 BARNES THORNBURG LLP 26 Attorneys for Publix Supermarkets 27 One North Wacker Drive #4400 28 Chicago, Illinois 60606 29 (312) 357-1313 30 Wessig@btlaw.com 31 Meredith.white@btlaw.com 32 Mcharchalis@btlaw.com 33 Kkapke@btlaw.com 34 BY: WILLIAM ESSIG, ESQ. 35 BY: MEREDITH WHITE, ESQ. (VIA ZOOM) 36 BY: MITCHELL CHARCHALIS (VIA ZOOM) 37 BY: KARA KAPKE, ESQ. (VIA ZOOM) 38 39 40 GREENBERG TRAURIG 41 Attorneys for Albertsons 42 90 South Seventh Street, Suite 3500, 43 Minneapolis, Minnesota 55402 44 (612) 259-9700 45 Tom.pack@gtlaw.com 46 BY: TOM PACK, ESQ.</p>	<p style="text-align: right;">Page 5</p> <p>1 I N D E X 2 PAGE 3 WITNESS: KATHERINE KEYES, Ph.D. 4 5 EXAMINATION BY MR. ESSIG 9 6 EXAMINATION BY MR. PACK 153 7 EXAMINATION BY MR. ESSIG 228 8 9 E X H I B I T S 10 NO. DESCRIPTION PAGE 11 Exhibit Keyes 1 Expert Report of Katherine Keyes, Ph.D., January 24, 2024 11 12 Exhibit Keyes 2 five pages of invoices produced by Dr. Keyes in the Cobb County matter 24 13 Exhibit Keyes 2A six additional pages of invoices produced by Dr. Keyes in the Cobb County matter 53 14 Exhibit Keyes 3A printout out of large spreadsheet Figure 7 & 14 49 15 Exhibit Keyes 3B printout of chart for Figure 9 & Table 1 50 16 Exhibit Keyes 3C printout of a spreadsheet for Figure 11 & Table 2 50 17 Exhibit Keyes 3D printout of a spreadsheet for Figure 13 51 18 Exhibit Keyes 4 Expert Report of Katherine Keyes April 15, 2024 154 19 20 21 22 23 24</p>

<p style="text-align: right;">Page 6</p> <p>1 EXHIBITS</p> <p>2 NO. DESCRIPTION PAGE</p> <p>3 Exhibit Keyes 5 Dr. Katherine 159</p> <p>4 Keyes Supplemental</p> <p>5 Materials</p> <p>6 Considered</p> <p>7 Exhibit Keyes 6 three pages of 163</p> <p>8 invoices produced</p> <p>9 by Dr. Keyes in</p> <p>10 the Tarrant matter</p> <p>11 Exhibit Keyes 7 article entitled, 195</p> <p>12 "The Changing Face</p> <p>13 of Heroin Use in</p> <p>14 the United States</p> <p>15 a Retrospective</p> <p>16 Analysis of the</p> <p>17 Past 50 Years,"</p> <p>18 authored by</p> <p>19 Cicero, et al.</p> <p>20 Exhibit Keyes 8 article entitled, 232</p> <p>21 "Predicting first</p> <p>22 use of heroin from</p> <p>23 prescription opioid</p> <p>24 use subtypes:</p> <p>Insights from the</p> <p>monitoring the</p> <p>future longitudinal</p> <p>Panel," authored</p> <p>by Dash, et al.</p> <p>Exhibit Keyes 9 article entitled, 239</p> <p>"Concordance</p> <p>between controlled</p> <p>substance receipt</p> <p>and post-mortem</p> <p>toxicology</p> <p>in opioid-detected</p> <p>overdose deaths:</p> <p>A statewide</p> <p>analysis,"</p> <p>authored by Howell,</p> <p>et al.</p>	<p style="text-align: right;">Page 8</p> <p>1 THE VIDEOGRAPHER: Good</p> <p>2 morning, everyone. We are going</p> <p>3 on the record at 9:11 a.m. Eastern</p> <p>4 time on Tuesday, May 14, 2024.</p> <p>5 Please note that the</p> <p>6 microphones are sensitive and may</p> <p>7 pick up whispering and private</p> <p>8 conversations. Please mute your</p> <p>9 phones at this time.</p> <p>10 This is Media Unit of the</p> <p>11 video recorded deposition of</p> <p>12 Katherine Keyes in the matter of</p> <p>13 In Re: National Prescription</p> <p>14 Opiate Litigation. This was</p> <p>15 filed in the United States District</p> <p>16 Court, Northern District of Ohio,</p> <p>17 Eastern Division. The Case</p> <p>18 Number is 1:18-OP-45817.</p> <p>19 My name is Corey Wainaina</p> <p>20 representing Veritext Legal</p> <p>21 Solutions and I am the Videographer.</p> <p>22 The Court Reporter is</p> <p>23 Silvia P. Wage, also, from the</p> <p>24 firm Veritext Legal Solutions.</p>
<p style="text-align: right;">Page 7</p> <p>1 - - -</p> <p>2 DEPOSITION SUPPORT INDEX</p> <p>3 - - -</p> <p>4</p> <p>5 Direction to Witness Not to Answer</p> <p>Page Line</p> <p>6</p> <p>7</p> <p>8 Request for Production of Documents</p> <p>Page Line</p> <p>9</p> <p>43 13</p> <p>10 45 4</p> <p>11</p> <p>Stipulations</p> <p>12 Page Line</p> <p>13</p> <p>14</p> <p>Question Marked</p> <p>15 Page Line</p> <p>16</p> <p>17</p> <p>Reservation</p> <p>18 Page Line</p> <p>19</p> <p>20</p> <p>Motion to Strike</p> <p>21 Page Line</p> <p>22</p> <p>23</p> <p>24</p>	<p style="text-align: right;">Page 9</p> <p>1 I am not authorized to</p> <p>2 administer an oath. I am not</p> <p>3 related to any party in this</p> <p>4 action. Nor am I financially</p> <p>5 interested in the outcome.</p> <p>6 Please be aware that all</p> <p>7 appearances and affiliations will</p> <p>8 be noted on the stenographic record.</p> <p>9 And will the Court Reporter</p> <p>10 please swear in the witness.</p> <p>11 THE STENOGRAPHER: Doctor,</p> <p>12 can you raise your right hand.</p> <p>13 KATHERINE KEYES, Ph.D.,</p> <p>14 Columbia University, 722 West 168th</p> <p>15 Street, New York, New York 10032,</p> <p>16 after having been duly sworn, was</p> <p>17 examined and testified as follows:</p> <p>18 THE STENOGRAPHER: Thank you.</p> <p>19 You may proceed.</p> <p>20 EXAMINATION BY MR. ESSIG:</p> <p>21 Q. Can you state your name</p> <p>22 please.</p> <p>23 A. Katherine Keyes.</p> <p>24 Q. And what is your professional</p>

<p style="text-align: right;">Page 10</p> <p>1 title?</p> <p>2 A. I am a Professor of</p> <p>3 epidemiology at the Mailman School of</p> <p>4 Public Health at Columbia University.</p> <p>5 Q. Alright. Professor Keyes,</p> <p>6 you understand you're here today to give</p> <p>7 your deposition with regard to your</p> <p>8 opinions in the opioid litigation,</p> <p>9 particularly, in Track 8 and Track 9 in</p> <p>10 the MDL? Do you understand that?</p> <p>11 A. Yes.</p> <p>12 Q. Okay. And you've given</p> <p>13 several depositions before in the opioid</p> <p>14 litigation; is that right?</p> <p>15 A. Yes.</p> <p>16 Q. And testified at trials?</p> <p>17 A. Yes.</p> <p>18 Q. Okay. And because we have a</p> <p>19 limited amount of time today, I'm going</p> <p>20 to try to stick to what's new, to the</p> <p>21 extent possible, which will be related to</p> <p>22 Cobb County. In fact, I'm mostly going</p> <p>23 to be asking you questions about your</p> <p>24 report for Track 8 related to Cobb</p>	<p style="text-align: right;">Page 12</p> <p>1 understand a question that I ask today,</p> <p>2 either cause I'm moving too fast or it</p> <p>3 just didn't make sense, please let me</p> <p>4 know and I'll try to rephrase it or ask</p> <p>5 it differently; is that fair?</p> <p>6 A. Fair.</p> <p>7 Q. And then, otherwise, if I ask</p> <p>8 a question and you're able to give me</p> <p>9 answer, we'll assume you felt you</p> <p>10 understood the question enough to provide</p> <p>11 an answer; is that fair?</p> <p>12 A. Okay.</p> <p>13 Q. Okay, great. Thank you.</p> <p>14 Now, you've previously been asked</p> <p>15 questions in depositions and at trials in</p> <p>16 opioid litigation.</p> <p>17 And I want to confirm today so that</p> <p>18 we can save some time that other than</p> <p>19 maybe corrections that you made in an</p> <p>20 errata sheet to a deposition, do you</p> <p>21 otherwise stand behind the testimony that</p> <p>22 you've previously given in the opioid</p> <p>23 litigation?</p> <p>24 MS. do AMARAL: Objection.</p>
<p style="text-align: right;">Page 11</p> <p>1 County, Georgia, which we've marked for</p> <p>2 identification as Keyes 1.</p> <p>3 I'm going to hand you a copy of</p> <p>4 that.</p> <p>5 (Deposition Exhibit Keyes 1,</p> <p>6 Expert Report of Katherine Keyes,</p> <p>7 Ph.D., January 24, 2024, was</p> <p>8 marked for identification.)</p> <p>9 MR. ESSIG: Does anybody</p> <p>10 else want a hardcopy?</p> <p>11 MS. do AMARAL: Thank you.</p> <p>12 MR. ESSIG: I have an extra.</p> <p>13 Q. And then after I finish my</p> <p>14 initial questions, Counsel for Albertsons</p> <p>15 Mr. Pack, will be asking you questions</p> <p>16 related to your Track 9 report and then I</p> <p>17 may have some follow-up questions; is</p> <p>18 that okay?</p> <p>19 A. Yes.</p> <p>20 Q. And I understand that you</p> <p>21 probably know all the ground rules for a</p> <p>22 deposition, so I'm not going to go over</p> <p>23 everything.</p> <p>24 But if for any reason you don't</p>	<p style="text-align: right;">Page 13</p> <p>1 Go ahead.</p> <p>2 A. Yes.</p> <p>3 Q. Okay. And all of your expert</p> <p>4 work in the opioid lawsuits have been on</p> <p>5 behalf of the governmental entities that</p> <p>6 are Plaintiffs seeking to recover money</p> <p>7 from various entities involved in the</p> <p>8 opioid supply chain; is that right?</p> <p>9 A. That's consistent with my</p> <p>10 understanding. I -- I produced the</p> <p>11 expert report, yes.</p> <p>12 Q. Okay. On Page 2 of your</p> <p>13 report, you state you produced expert</p> <p>14 reports and provided testimony in opioid</p> <p>15 litigations as since 2018; is that</p> <p>16 correct?</p> <p>17 A. Yes.</p> <p>18 Q. What percentage of your</p> <p>19 overall professional time, meaning,</p> <p>20 inclusive of your work at Columbia,</p> <p>21 anything else that you do professionally,</p> <p>22 since you began working on the opioid</p> <p>23 litigation since 2018 has been spent on</p> <p>24 opioid litigation-related work?</p>

<p style="text-align: right;">Page 14</p> <p>1 A. Within a calendar year or...</p> <p>2 Q. Can you give me a broader</p> <p>3 percentage since 2018? Is it 5 percent,</p> <p>4 20 percent?</p> <p>5 A. It would really depend,</p> <p>6 because throughout the year there is long</p> <p>7 stretches of time where I'm not doing</p> <p>8 expert work. There are stretches of</p> <p>9 times -- you know, if there's a trial, I</p> <p>10 might be spending more time.</p> <p>11 So it would be difficult to give a</p> <p>12 precise percentage. And it's will</p> <p>13 changed from year to year. So there are</p> <p>14 some years where I would say it's -- my</p> <p>15 percentage of time would be relatively</p> <p>16 low.</p> <p>17 It's hard. It would be hard to</p> <p>18 give a precise percentage.</p> <p>19 Q. When was the last time you</p> <p>20 gave a deposition in the opioid</p> <p>21 litigation?</p> <p>22 A. I'm not sure.</p> <p>23 Q. When was the last time you</p> <p>24 testified at trial in the opioid</p>	<p style="text-align: right;">Page 16</p> <p>1 come in and out of various cases. So I'm</p> <p>2 not sure.</p> <p>3 Q. Okay. So, as you sit here</p> <p>4 today, do you have any recollection of</p> <p>5 ever having testified in a case in the</p> <p>6 opioid litigation involving Publix?</p> <p>7 A. I don't.</p> <p>8 Q. Have you ever shopped at a</p> <p>9 Publix?</p> <p>10 A. Yes.</p> <p>11 Q. And where, when, how many</p> <p>12 times?</p> <p>13 A. Well, mostly, in Florida. I</p> <p>14 don't know that we -- I don't recall any</p> <p>15 Publix's in New York. And I've been to</p> <p>16 Florida several times over the past few</p> <p>17 years. I would say I've shopped in</p> <p>18 Publix, I don't know, 20 times, 30 times.</p> <p>19 Q. Have you ever obtained a</p> <p>20 prescription at a Publix pharmacy?</p> <p>21 A. No.</p> <p>22 Q. And do you agree that you're</p> <p>23 not going about be offering any testimony</p> <p>24 in the trial of this case involving any</p>
<p style="text-align: right;">Page 15</p> <p>1 litigation?</p> <p>2 A. I think the last trial I</p> <p>3 testified in was in New Mexico in October</p> <p>4 of 2022, but I would need to double-check</p> <p>5 that.</p> <p>6 Q. Have you been paid by any</p> <p>7 nongovernmental entities or -- meaning --</p> <p>8 or not by plaintiff's attorneys either,</p> <p>9 but physicians groups or patient</p> <p>10 associations, et cetera, for any work</p> <p>11 that you've done for the work that you've</p> <p>12 done over the years related to opioids?</p> <p>13 A. Not that I can recall at this</p> <p>14 time.</p> <p>15 Q. Is this your first expert</p> <p>16 report in your years of working in the</p> <p>17 opioid litigation where you've offered</p> <p>18 opinions in the case brought against my</p> <p>19 client Publix?</p> <p>20 A. I'm not -- I'm not 100 percent</p> <p>21 sure, but you probably have a better</p> <p>22 understanding than me of that.</p> <p>23 Throughout the years there have</p> <p>24 been quite a few defendants that have</p>	<p style="text-align: right;">Page 17</p> <p>1 of your personal experiences with Publix?</p> <p>2 A. No personal experiences with</p> <p>3 Publix. No, I don't plan to.</p> <p>4 Q. And similarly or separately</p> <p>5 -- let me start again.</p> <p>6 Do you agree that you're not going</p> <p>7 to be offering any opinions at the trial</p> <p>8 of this case with regard to specific</p> <p>9 actions or inactions by Publix or its</p> <p>10 employees with regard to prescription</p> <p>11 opioids?</p> <p>12 A. I would say that my report</p> <p>13 provides an overview of pharmacy</p> <p>14 dispensing and its association with</p> <p>15 various opioid-related outcomes. So, to</p> <p>16 the extent that Publix contributed to</p> <p>17 those data that I'm reporting on, then I</p> <p>18 would say that I am testifying about</p> <p>19 Publix' actions or inactions.</p> <p>20 Q. Alright. Let me try it a</p> <p>21 different way.</p> <p>22 You have not reviewed any documents</p> <p>23 produced by Publix in the opioid</p> <p>24 litigation in this case in Track 8; is</p>

<p style="text-align: right;">Page 18</p> <p>1 that correct?</p> <p>2 A. I have not reviewed documents</p> <p>3 produced by Publix. However, I have</p> <p>4 reviewed data in which Publix is included</p> <p>5 in the datasets.</p> <p>6 Q. And that would be what kind</p> <p>7 of "data"?</p> <p>8 A. Prescription data in the</p> <p>9 various databases that I've reviewed and</p> <p>10 the studies that I've reviewed.</p> <p>11 Q. Okay. And we'll get to that</p> <p>12 in a minute.</p> <p>13 But with regard to any actions by</p> <p>14 any specific say pharmacist at a Publix,</p> <p>15 other experts may cover those issues, but</p> <p>16 that's not part of your opinions in this</p> <p>17 case, correct?</p> <p>18 A. I do not have opinions about</p> <p>19 any specific pharmacists, but I -- my</p> <p>20 report dots cover the collective</p> <p>21 dispensing of pharmacists in Publix.</p> <p>22 Q. Okay. And do you know if</p> <p>23 your report is word searched, the word</p> <p>24 "Publix" does not appear once?</p>	<p style="text-align: right;">Page 20</p> <p>1 Q. Do you recall who first</p> <p>2 contacted you to work on the Cobb County</p> <p>3 case?</p> <p>4 A. I don't.</p> <p>5 Q. And the report that you have</p> <p>6 in front of you, Keyes Exhibit 1, did you</p> <p>7 draft that report yourself?</p> <p>8 A. Yes.</p> <p>9 Q. Did you have any assistance</p> <p>10 from anyone in preparing the report?</p> <p>11 A. Yes.</p> <p>12 Q. Who assisted you?</p> <p>13 A. Caroline Rutherford.</p> <p>14 Q. Who is Caroline Rutherford?</p> <p>15 A. She is a data analyst with a</p> <p>16 Master's degree in data science from</p> <p>17 Columbia and has worked with me on this</p> <p>18 -- on these reports for six years.</p> <p>19 Q. Does Ms. Rutherford work for</p> <p>20 you in nonopioid litigation context as</p> <p>21 well?</p> <p>22 A. Yes.</p> <p>23 Q. How did you select Ms.</p> <p>24 Rutherford to be the person to assist you</p>
<p style="text-align: right;">Page 19</p> <p>1 A. That's correct.</p> <p>2 Q. The word "opioid" appears 700</p> <p>3 -- 1736 times.</p> <p>4 Do you know that?</p> <p>5 A. I take your word for it.</p> <p>6 Q. Alright. So let's go to the</p> <p>7 Track 8 report that you have in front of</p> <p>8 you.</p> <p>9 You issued this report on</p> <p>10 January 24th of 2024; is that right?</p> <p>11 A. Yes.</p> <p>12 Q. And who -- when were you first</p> <p>13 contacted to work in the Cobb County case?</p> <p>14 A. I don't recall the specific</p> <p>15 date that I was contacted for CT9.</p> <p>16 Q. Okay. Your invoices -- and</p> <p>17 we'll get to them in a minute -- show</p> <p>18 that the first work that you billed for</p> <p>19 for the Cobb County case was on</p> <p>20 December 3rd of 2022.</p> <p>21 Does that seem about right to you?</p> <p>22 A. I -- I -- if that's what my</p> <p>23 invoices reflect, I believe what is on my</p> <p>24 invoices.</p>	<p style="text-align: right;">Page 21</p> <p>1 for your report in this case?</p> <p>2 A. He have worked together for</p> <p>3 many years at Columbia and she is a very</p> <p>4 skilled data analyst and so it was a</p> <p>5 natural fit for the work that I needed</p> <p>6 help with.</p> <p>7 Q. And what kinds of work does</p> <p>8 she do in helping to prepare the report</p> <p>9 that you did in this case?</p> <p>10 A. She analyzes data and helps</p> <p>11 me with the figures and charts that are</p> <p>12 in the report. She, also, does other</p> <p>13 research assistant work helping manage</p> <p>14 references and helping with other kind of</p> <p>15 logistical aspects of the report.</p> <p>16 Q. Is it fair to say that your</p> <p>17 main generic report, which is the first</p> <p>18 part of your report in the case, is based</p> <p>19 largely on your prior Track 7 report with</p> <p>20 some edits and additions for Track 8?</p> <p>21 MS. do AMARAL: Objection,</p> <p>22 vague.</p> <p>23 A. I would say that there's</p> <p>24 substantial overlap of this report with</p>

<p style="text-align: right;">Page 22</p> <p>1 prior reports. But I'm always trying to 2 stay updated with the literature. So 3 there are some -- there are some new 4 science that I've added. 5 Q. And to try to make it a 6 little easier to handle today, I stapled 7 the first part of the report that 8 contains the report and your Schedule A 9 on Cobb County and then the references 10 and everything else is kind of to the 11 side. 12 I think you've done that already, 13 okay? 14 A. Yes. 15 Q. Okay. So -- and, obviously, 16 your Schedule A on Cobb County, that's 17 different from the Schedule A in the 18 Track 7 report about counties in Ohio, 19 right? 20 A. Yes. 21 Q. With information about Cobb 22 County, Georgia? 23 A. Yes. 24 Q. Are all have of the opinions</p>	<p style="text-align: right;">Page 24</p> <p>1 deposition here? 2 A. Yes. 3 Q. Alright. I'm going to hand 4 you what we've marked for identification 5 as Exhibit 2 to your deposition. 6 (Deposition Exhibit Keyes 2, 7 five pages of invoices produced by 8 Dr. Keyes in the Cobb County matter, 9 was marked for identification.) 10 Q. Can you tell us what Exhibit 2 11 is? 12 A. These are invoices for CT8, 13 Case Track 8 for both myself and for 14 Caroline Rutherford. 15 Q. And I'll state these invoices 16 were produced to us yesterday and we put 17 them together in an exhibit. 18 So this is the whole of the 19 invoices that currently exist with regard 20 to your work and Ms. Rutherford's work in 21 Track 8; is that right? 22 A. I believe so. I haven't gone 23 back to verify it. But if this is what's 24 been produced to you, I assume that it's</p>
<p style="text-align: right;">Page 23</p> <p>1 that you intend to offer at the trial of 2 this case contained in your report there 3 in Exhibit A inclusive of Schedule A on 4 Cobb County? 5 A. Yes, the opinions I currently 6 plan to offer are in the report. 7 Q. And do you have any current 8 plans to change or update any of the 9 content of your report? 10 A. Not currently. 11 Q. Do you recall offhand how 12 many hours you've billed for your work on 13 the Track 8 litigation? 14 A. It's been a more prolonged 15 period of time. So I'm not sure. I'm 16 sure it's on the invoices. 17 Q. How much are you charging per 18 hour for your work on this case? 19 A. Seven hundred dollars. 20 Q. And that's per hour for any 21 activity, any kind of work you do for the 22 case? 23 A. Yes. 24 Q. Including your time spent in</p>	<p style="text-align: right;">Page 25</p> <p>1 accurate. 2 Q. Okay. And the most recent 3 invoices here are for you. There is one 4 on the third page dated June 30th of 2023. 5 Do you see that? 6 A. Yes. 7 Q. Is that the most recent 8 invoice you've issued in this case? 9 A. Again, I would have to 10 double-check to be sure but... 11 Q. Do you have any un-invoiced 12 time, other than today's deposition that 13 you plan to be billing for? 14 A. Other than time this month, 15 you know, it's monthly but... 16 Q. What have you done this month 17 with regard to your work in the Track 8 18 litigation? 19 A. Prepared for this deposition. 20 Q. What did you do to prepare? 21 A. I reviewed my report and the 22 materials in the report. 23 Q. Did you meet with anyone in 24 preparation for the deposition today?</p>

7 (Pages 22 - 25)

<p style="text-align: right;">Page 26</p> <p>1 A. Yes.</p> <p>2 Q. Who did you meet with?</p> <p>3 A. I met with Paulina and the</p> <p>4 other lawyers here.</p> <p>5 Q. And when was that?</p> <p>6 A. Yesterday and last Friday for</p> <p>7 a couple hours each time.</p> <p>8 Q. So that's four more hours</p> <p>9 you'll be billing for?</p> <p>10 A. Yes. And then over the</p> <p>11 weekend, I reviewed my report and</p> <p>12 references and inputs by sheets just to</p> <p>13 refresh my memory.</p> <p>14 Q. So the first invoice, first</p> <p>15 page here of Exhibit 2, shows time from</p> <p>16 December 3rd of 2022 and the purpose you</p> <p>17 have is "report."</p> <p>18 Do you see that?</p> <p>19 A. I do.</p> <p>20 Q. Okay. When you write down</p> <p>21 "report" on your invoice, what does that</p> <p>22 mean?</p> <p>23 A. That means that I'm working</p> <p>24 on the report, writing, updating,</p>	<p style="text-align: right;">Page 28</p> <p>1 next invoice from February of 2023, it</p> <p>2 looks like you changed your fee at that</p> <p>3 time to \$700 an hour; is that right?</p> <p>4 A. That's what it looks to me as</p> <p>5 well.</p> <p>6 Q. And why did you decide to</p> <p>7 increase your hourly rate in 2023?</p> <p>8 A. At that point, I had had more</p> <p>9 experience and I had, you know, been</p> <p>10 working on the case for sometime at that</p> <p>11 point and my understanding is that it's</p> <p>12 standard for experts to adjust their</p> <p>13 rates based on experience.</p> <p>14 Q. So, based on the three</p> <p>15 invoices that were produced to us for</p> <p>16 your time on Track 8, it looks like you</p> <p>17 spent a total of 25 hours. Twenty of</p> <p>18 those hours are listed as "report" on the</p> <p>19 invoices. Four of them are listed as</p> <p>20 "meeting." And one is for "review</p> <p>21 materials."</p> <p>22 Does that seem about right to you?</p> <p>23 A. That seems, like, correct</p> <p>24 based on what has been provided. And if</p>
<p style="text-align: right;">Page 27</p> <p>1 analyzing data. I'm doing work for -- to</p> <p>2 produce the materials in the report.</p> <p>3 Q. Okay. So I took the time to</p> <p>4 use my trusted calculator and try to add</p> <p>5 up your time.</p> <p>6 For your part of the invoices, the</p> <p>7 first three pages here of Exhibit 2, and</p> <p>8 my math shows that you billed to date</p> <p>9 25 hours for a total of \$16,150.</p> <p>10 MS. do AMARAL: Counsel, if</p> <p>11 I may. I think that there's an</p> <p>12 invoice missing, which we will</p> <p>13 provide to you at a break.</p> <p>14 MR. ESSIG: Okay.</p> <p>15 MS. do AMARAL: Okay.</p> <p>16 MR. ESSIG: Excellent.</p> <p>17 Q. So -- and at the beginning of</p> <p>18 your work in Track 8, it looks like you</p> <p>19 were billing \$550 an hour; is that right</p> <p>20 on the first page?</p> <p>21 A. That's probably correct, yes.</p> <p>22 Q. Okay. And that was time in</p> <p>23 2022.</p> <p>24 And then on the second page, your</p>	<p style="text-align: right;">Page 29</p> <p>1 there's any updated materials, then I</p> <p>2 would adjust my answer to reflect those</p> <p>3 updated materials as well.</p> <p>4 Q. Okay. And for the entries</p> <p>5 that say, "meeting," none of those entries</p> <p>6 reflect or record who you met with; is</p> <p>7 that right?</p> <p>8 A. That's right.</p> <p>9 Q. As you sit here today, do you</p> <p>10 have any recollection as to who you may</p> <p>11 have met with for any of the four hours</p> <p>12 of meeting time that you've invoiced to</p> <p>13 date?</p> <p>14 A. Those meetings are listed in</p> <p>15 the report and they are meetings I had</p> <p>16 with people in Cobb County to better</p> <p>17 understand the data that I was -- and the</p> <p>18 opinions that I was producing in this</p> <p>19 report to ensure that they reflected what</p> <p>20 was going on in Cobb County.</p> <p>21 Q. And do you recall offhand who</p> <p>22 those people in Cobb County were that you</p> <p>23 met with?</p> <p>24 A. If I just -- to ensure that I</p>

<p style="text-align: right;">Page 30</p> <p>1 state it correctly, I would like to refer 2 to my report. 3 Is that acceptable? 4 Q. Well, we'll get into the 5 folks in a minute. 6 But just without looking at your 7 report, do you remember who you met with 8 at Cobb County? 9 A. There was Dr. Gullledge, Missy 10 Owens, several other folks as well. 11 Q. In addition in Exhibit 2, the 12 last two pages are invoices for Caroline 13 Rutherford's time and she billed 11 and a 14 half hours in 2023 for her work on this 15 case at a rate of \$200 an hour. 16 Does that sound about right to you? 17 A. That sounds about right, yes. 18 Q. So understanding that we 19 don't have all your invoices yet but that 20 you billed with your time and Ms. 21 Rutherford's time so far \$18,450, okay, 22 if you do the math, and adding that to 23 your prior work in the opioid litigation, 24 do you -- can you give us a figure as to</p>	<p style="text-align: right;">Page 32</p> <p>1 litigation? 2 A. In terms of what letterhead 3 to use? 4 Q. Or anything else with regards 5 to using their time professionally in 6 litigation. 7 A. I don't use Columbia's time 8 professionally in litigation. 9 Q. So, I guess, I'm confused. 10 You're a full-time professor at 11 Columbia, correct? 12 A. Yes. 13 Q. And you work for plaintiffs 14 firms in the opioid litigation on your 15 own time? 16 A. Correct. 17 Q. So then why do you use a 18 Columbia logo, as opposed to a Katherine 19 Keyes logo at the time of the invoice? 20 A. It's just standard. I have 21 always used the letterhead. This is the 22 letterhead that I use. 23 Q. Now, in your report here for 24 Track 8, you have two lists of references</p>
<p style="text-align: right;">Page 31</p> <p>1 how much you've billed to date for your 2 work in the opioid litigation? 3 A. Across the entire six years? 4 Q. Correct. 5 A. I -- I think, it is somewhere 6 around \$350,000, \$400,000, somewhere in 7 that ballpark. 8 Q. And I notice that the 9 invoices have the Columbia University 10 Mailman School of Public Health logo on 11 the top, correct? 12 A. Yes. 13 Q. Where does the money go that 14 is remitted to you in the case? 15 A. It goes to me. 16 Q. Okay. Did you have to get 17 any kind of approval from anyone at 18 Columbia to use a Columbia letterhead for 19 invoicing related to personal work that 20 you're doing in the opioid litigation? 21 A. No. 22 Q. Do you know if there's any 23 sort of guideline that Columbia has for 24 professors who are doing private work in</p>	<p style="text-align: right;">Page 33</p> <p>1 for materials that you've cited that 2 you've reviewed. The first one starts on 3 Page 57 and runs through Page 75. And 4 then the second list starts at Page 25 of 5 Schedule A and runs through Page 33. 6 And then your Exhibit B also 7 contains a list of materials considered 8 that runs from Page 1 to 140 that 9 contains 2,562 references to articles and 10 other documents. 11 My question for you is, did you 12 prepare all of these lists? 13 A. I prepare my CV and I reviewed 14 the materials considered list. I didn't 15 directly assemble the materials considered 16 list, but I reviewed it. 17 Q. Do you know who prepared the 18 lists then? 19 A. I don't. 20 Q. But they were provided to you 21 as part of your work in the litigation? 22 A. Yes. There's an ongoing 23 materials considered document that is 24 maintained that I review with each case.</p>

<p style="text-align: right;">Page 34</p> <p>1 Q. And that's provided to you by 2 someone in the plaintiff's firms? 3 A. Yes. 4 Q. And then the list of 5 references that I talked about, not the 6 long Exhibit B, but the references inside 7 the report. 8 Do you prepare that list or does 9 someone else prepare the list for you? 10 A. That I prepare. 11 Q. Now, do these lists contain 12 everything that you've considered in 13 arriving at your opinions in this case? 14 MS. do AMARAL: Objection, 15 vague. 16 Go ahead. 17 A. Generally, yes. I mean, I'm 18 a practicing epidemiologist. So I'm 19 reviewing the literature all the time. 20 But the references in the report and the 21 materials considered list represent the, 22 I think, some of the key papers that I 23 relied on. But I would just state that 24 in the course of my day-to-day work, I'm</p>	<p style="text-align: right;">Page 36</p> <p>1 Q. Why not? 2 A. All of my work product is 3 reflected in the report. You know, when 4 I'm reading a paper on my computer, I 5 don't make additional notes. 6 Q. So you don't have a practice 7 of taking notes while you review 8 complicated epidemiological articles? 9 A. No. 10 Q. And Exhibit B to your report, 11 the 2,562 references, were these 12 materials all provided to you by Counsel 13 or did you obtain them independently? 14 A. Both. 15 Q. What kinds of materials did 16 you obtain on your own? 17 A. Articles -- journal articles 18 from the peer reviewed literature, data 19 that is available to me, dashboard 20 material, for example, from the county, 21 publically available data sources. That 22 would be the majority of what I obtained 23 on my own. 24 Q. Okay. Have you talked to any</p>
<p style="text-align: right;">Page 35</p> <p>1 always taking in additional information. 2 Q. Okay. And that reminds me. 3 So -- and we're going to go through 4 your Cobb County report in specifics very 5 soon. And there is a lot of materials in 6 there that you reviewed and you cite and 7 rely upon in your report. 8 But you only billed one hour for 9 reviewing materials in this case so far. 10 How does that work? 11 A. So that line item -- you 12 know, when I'm reviewing materials when 13 the invoice says, "report." That, also, 14 includes reviewing additional materials. 15 But sometimes I spend time only on 16 reviewing materials and not on writing 17 the report itself. 18 So the materials that I reviewed 19 for this case are subsumed in the report 20 line item as well. 21 Q. Did you make any notes as you 22 were reviewing these materials in your 23 work on the Track 8 report? 24 A. No.</p>	<p style="text-align: right;">Page 37</p> <p>1 other experts for Cobb County about this 2 case or your opinions? 3 A. I don't believe so. 4 Q. Have you performed any 5 academic research specific to Cobb County, 6 Georgia? 7 A. My academic research includes 8 data that has included Cobb County. So, 9 in that sense, I've done research that is 10 specific to Cobb County. 11 Q. Okay. I understand that you 12 do a lot of research that's national, and 13 national data may include Cobb County 14 data; is that fair? 15 A. And state level data as well. 16 Q. Fair enough. 17 A. And, actually, I do a lot of 18 county level analyses so -- 19 Q. Okay. Let me ask -- I didn't 20 mean to cut you off. 21 Let me ask it a different way. 22 Have you performed any academic 23 research where you were ever physically 24 present in Cobb County, Georgia?</p>

<p style="text-align: right;">Page 38</p> <p>1 A. Have I performed academic 2 research well in Cobb County? 3 Q. About Cobb County issues, yes. 4 A. About Cobb County or -- I'm 5 sorry. I'm not understanding the 6 question. 7 Q. Sure. Let me back up a 8 minute. 9 Do you know where Cobb County, 10 Georgia is? 11 A. Yes. 12 Q. Where is Cobb County, Georgia? 13 A. What are you -- I'm not... 14 Q. What part of the state is it 15 located in? 16 A. It's in the Atlanta area. 17 Q. Okay. And my question is, 18 putting aside litigation first, for your 19 academic research, have you ever 20 physically gone to Cobb County, Georgia 21 to do any kind of academic research 22 related to Cobb County, Georgia? 23 A. I have been to Cobb County, 24 Georgia. I have presented academic</p>	<p style="text-align: right;">Page 40</p> <p>1 I get his title correct? 2 Q. If you need to, you know. 3 You don't know who he is without 4 referring to the report? 5 A. I don't remember his specific 6 title. But I know I put his title in the 7 report. I just don't want to misstate. 8 Q. Okay. Sure. 9 A. Okay. So, on Page 6 of the 10 county specific report, I state that he 11 is the Chief Medical Examiner in Cobb 12 County since 2015. 13 Q. And who is Nick Adams or 14 Nicholas Adams? 15 A. Also, on page 6 of the 16 report, I specify that he is Chief who is 17 involved in the provision of emergency 18 medical services in Cobb County. 19 Q. Okay. And who is Melissa 20 Owen? 21 A. Let me just find the page. 22 On Page 11, I state that she is the 23 Director of the Davis Direction 24 Foundation.</p>
<p style="text-align: right;">Page 39</p> <p>1 research in Cobb County, Georgia. That 2 academic research may have included data 3 that included Cobb County. 4 Q. Have you authored or 5 co-authored peer reviewed or articles 6 specific to Cobb County that contains the 7 word "Cobb County" in the title or in the 8 body of the article? 9 A. I would have to look through 10 my CV, because I do do research that is 11 county specific. So I'm not sure. 12 Q. Okay. Other than the 13 meetings that you had with Counsel and 14 the reviewing of documents, did you do 15 anything else to prepare for your 16 deposition today? 17 A. No. 18 Q. And have you done any work on 19 the Cobb County case since issuing your 20 report there in 2023 -- sorry, 2024? 21 A. No. 22 Q. Okay. Who is Christopher 23 Gullledge? 24 A. May I refer to my report, so</p>	<p style="text-align: right;">Page 41</p> <p>1 Q. Okay. Do you recall that 2 these three individuals are the only 3 three individuals listed in your report 4 as people that you interviewed who work 5 in Cobb County? 6 A. Yes. 7 Q. Did you interview anyone else 8 in Cobb County for your work on this case? 9 A. No. 10 Q. Who arranged these interviews 11 for you? 12 A. Typically, I have a number of 13 requests that I make of the Plaintiffs' 14 Counsel in terms of types of information 15 that I want to verify in the county with 16 county specific professionals. And so, 17 for example, I might say I really want to 18 talk to the Medical Examiner or, you 19 know, someone who is involved in the 20 records. 21 And so then the Plaintiffs' Counsel 22 will then identify who the Medical 23 Examiner is, for example. And that is 24 true for the other interviews as well.</p>

<p style="text-align: right;">Page 42</p> <p>1 I, typically, say what category or, 2 you know, job of someone in the county 3 that I want to speak with and then they 4 will identify the appropriate person. 5 Q. So, with regard to Christopher 6 Gullledge, when did you speak with him? 7 A. I assume based on the -- 8 based on the invoices that I spoke with 9 him probably in sometime between December 10 2022 and June 2023. 11 Q. And was that on the telephone 12 or by Zoom or in person? 13 A. I believe that it was by 14 telephone. 15 Q. Was anyone else on the call 16 with you? 17 A. Yes. 18 Q. Who else was on the call? 19 A. There was several Plaintiffs' 20 Counsel on the call as well and Ms. 21 Rutherford as well. 22 Q. Okay. And how long was the 23 call with Christopher Gullledge? 24 A. I had several conversations</p>	<p style="text-align: right;">Page 44</p> <p>1 death investigations in Cobb County; how 2 suspected drug overdose is investigated; 3 how toxicology and autopsy are performed; 4 and how the death certificates are 5 produced. 6 Q. Chief Adams, when did you 7 speak with him? 8 A. In that same time frame 9 between December 2022 and January -- June 10 2023. 11 Q. So somewhere during the 12 entirety of your work on the case; is 13 that fair to say? 14 A. Uh-huh, yes. 15 Q. And how long did you talk to 16 him? 17 A. I believe, I, also, spoke 18 with him twice and those meetings, also, 19 would be between 30 minutes to an hour. 20 Q. And was that with Plaintiffs' 21 Attorneys on the phone too? 22 A. Yes. 23 Q. And did you take notes? 24 A. Yes, same. I, typically, take</p>
<p style="text-align: right;">Page 43</p> <p>1 with Christopher Gullledge and I would say 2 that they probably lasted 30 minutes to 3 an hour. 4 Q. And did you take any notes 5 from those conversations? 6 A. Yes. 7 Q. Handwritten or on the 8 computer? 9 A. Handwritten. 10 Q. Where are those notes? 11 A. I will -- I have them in my 12 notebook and I can produce them. 13 Q. [REQUEST] I ask that you talk 14 to Counsel afterwards and if you can 15 produce those to us, we would appreciate 16 it. 17 And that goes for any of the 18 interviews that you conducted in -- 19 related to Cobb County. 20 A. Yes. 21 Q. Okay. And what did you, 22 generally, discuss with Mr. Gullledge or 23 Dr. Gullledge? 24 A. I discussed the process of</p>	<p style="text-align: right;">Page 45</p> <p>1 notes during those meetings and in all 2 case the we produced those notes to 3 Counsel. 4 [REQUEST] So we will produce those. 5 Q. Okay. And then the last -- 6 or the third person you interviewed was 7 Melissa Owen. 8 When did you speak with her? 9 A. Same, in the time period 10 between December 2022 and June 2023. 11 Q. Okay. And that was with 12 Plaintiffs' Attorneys as well on the 13 telephone? 14 A. It may have been Zoom. It 15 was either Zoom or telephone. I think it 16 was Zoom, actually. 17 Q. And did you take notes from 18 that interview? 19 A. Yes. 20 Q. Did you speak with her once 21 or more than once? 22 A. I believe I spoke with her 23 once. 24 Q. And you've reviewed her</p>

<p style="text-align: right;">Page 46</p> <p>1 deposition in the case, correct?</p> <p>2 A. Yes.</p> <p>3 Q. Okay. Do you recall that</p> <p>4 when Melissa Owen was asked in her</p> <p>5 August 2023 deposition in this case if</p> <p>6 Cobb County has a heroin crises, she</p> <p>7 testified, quote, "mostly, it's fentanyl</p> <p>8 crisis right now"?</p> <p>9 Do you agree with her?</p> <p>10 A. In my review of the data from</p> <p>11 Cobb County, I would state that there are</p> <p>12 several crises in Cobb County related to</p> <p>13 drug overdose. Certainly, synthetic</p> <p>14 opioids including fentanyl are</p> <p>15 contributing to death in Cobb County,</p> <p>16 that there are a number of other opioid</p> <p>17 products that continue to contribute to</p> <p>18 death in Cobb County as well.</p> <p>19 Q. Were you, also, aware that</p> <p>20 she testified in her deposition that most</p> <p>21 of the people with drug problems in Cobb</p> <p>22 County obtain their drugs in Fulton</p> <p>23 County?</p> <p>24 A. I reviewed that in her</p>	<p style="text-align: right;">Page 48</p> <p>1 Q. And the file itself was</p> <p>2 labeled, "Copy of Track 8 Expert Report</p> <p>3 Input Calculations 080223."</p> <p>4 Did you give that file that name or</p> <p>5 someone else?</p> <p>6 A. It was either me or Caroline</p> <p>7 Rutherford. We worked collaboratively on</p> <p>8 those spreadsheets. And I can't recall</p> <p>9 who physically named the file, but it was</p> <p>10 one of the two of us.</p> <p>11 Q. Okay. Does the "080223" in</p> <p>12 the file name indicate that these</p> <p>13 calculations were made and the</p> <p>14 spreadsheets were saved around either</p> <p>15 August 2nd of 2023 or perhaps if it's</p> <p>16 European style February 8th of 2023?</p> <p>17 A. It would indicate that the</p> <p>18 document was worked on -- I would imagine</p> <p>19 it's August of 2023. But it -- but I'm</p> <p>20 not sure that that date accurately</p> <p>21 reflects when it was started or finished.</p> <p>22 Q. Okay. And I would note that</p> <p>23 in the invoices that we have in Exhibit 2,</p> <p>24 there's no work shown billed by either</p>
<p style="text-align: right;">Page 47</p> <p>1 deposition.</p> <p>2 Q. Besides these three people in</p> <p>3 Cobb County, did you speak to anyone</p> <p>4 employed by any state governmental agency</p> <p>5 in George, as part of your work on this</p> <p>6 report?</p> <p>7 A. I don't believe so.</p> <p>8 Q. Did you speak with anyone</p> <p>9 else who is any member of Georgia state</p> <p>10 boards or commissions related to the</p> <p>11 issues in this case as part of your work</p> <p>12 in this report?</p> <p>13 A. I did not need to in order to</p> <p>14 produce the opinions in my report. So I</p> <p>15 did not.</p> <p>16 Q. Counsel for Cobb County,</p> <p>17 also, produced to us electronically a</p> <p>18 spreadsheet of certain calculations of</p> <p>19 data that were performed related to your</p> <p>20 report in this case.</p> <p>21 Do you recall reviewing spreadsheets</p> <p>22 with calculations specific to Cobb County</p> <p>23 as part of your work in this case?</p> <p>24 A. Yes. And -- yes.</p>	<p style="text-align: right;">Page 49</p> <p>1 you or Ms. Rutherford on that date.</p> <p>2 A. We can go back and check what</p> <p>3 -- if there's anything missing on those</p> <p>4 dates.</p> <p>5 MS. do AMARAL: Counsel, if</p> <p>6 you'd would like to take a break,</p> <p>7 we can provide you with a couple</p> <p>8 of other invoices.</p> <p>9 MR. ESSIG: We can take a</p> <p>10 quick break, if you want to do that.</p> <p>11 MS. do AMARAL: Or we can</p> <p>12 go to whenever you want to --</p> <p>13 MR. ESSIG: I'm going to do a</p> <p>14 couple of things and then maybe</p> <p>15 we'll take a break; is that alright?</p> <p>16 MS. do AMARAL: That's fine.</p> <p>17 Q. Alright. So, because I'm old</p> <p>18 school, I printed these out.</p> <p>19 The first sheet received -- they're</p> <p>20 all going to be Group Exhibit 3, but</p> <p>21 we're going to give you Keyes 3A.</p> <p>22 (Deposition Exhibit Keyes 3A,</p> <p>23 printout out of large spreadsheet</p> <p>24 Figure 7 & 14, was marked for</p>

<p style="text-align: right;">Page 50</p> <p>1 identification.)</p> <p>2 Q. And that was labeled on the</p> <p>3 spreadsheet as being for "Figure 7 and</p> <p>4 Figure 14."</p> <p>5 And then I'm going to hand you what</p> <p>6 we've marked for identification as Keyes</p> <p>7 3B.</p> <p>8 (Deposition Exhibit Keyes 3B,</p> <p>9 printout of chart for Figure 9 &</p> <p>10 Table 1, was marked for</p> <p>11 identification.)</p> <p>12 Q. And that was marked on the</p> <p>13 spreadsheet as being for "Figure 9 and</p> <p>14 Table 1."</p> <p>15 Next, I'm going to hand you what we</p> <p>16 marked for identification as Keyes 3C.</p> <p>17 This is a spreadsheet that was marked on</p> <p>18 the Excel file as being for "Figure 11</p> <p>19 and Table 2."</p> <p>20 (Deposition Exhibit Keyes 3C,</p> <p>21 printout of a spreadsheet for</p> <p>22 Figure 11 & Table 2, was marked</p> <p>23 for identification.)</p> <p>24 Q. And last but not least, I'm</p>	<p style="text-align: right;">Page 52</p> <p>1 that or were these all done for you by</p> <p>2 Ms. Rutherford?</p> <p>3 A. Both. It depends. We work</p> <p>4 on it collaboratively. So there might be</p> <p>5 specific numbers that I entered, specific</p> <p>6 numbers that she entered.</p> <p>7 Q. Okay.</p> <p>8 A. But I reviewed all of the</p> <p>9 work.</p> <p>10 Q. Okay.</p> <p>11 MR. ESSIG: It's probably a</p> <p>12 good time for a quick break.</p> <p>13 MS. do AMARAL: Okay.</p> <p>14 THE VIDEOGRAPHER: We are off</p> <p>15 the record. The time is 9:51 a.m.</p> <p>16 (Recess taken 9:51 to</p> <p>17 a.m.)</p> <p>18 THE VIDEOGRAPHER: We are</p> <p>19 back on the record. The time is</p> <p>20 10:06 a.m.</p> <p>21 Q. Professor Keyes, you</p> <p>22 understand we are back on the record here</p> <p>23 now?</p> <p>24 A. Yes.</p>
<p style="text-align: right;">Page 51</p> <p>1 going to hand you a printout of the</p> <p>2 fourth spreadsheet that was provided to</p> <p>3 us in the Excel file that was marked as</p> <p>4 being for Figure 13.</p> <p>5 (Deposition Exhibit Keyes 3D,</p> <p>6 printout of a spreadsheet for</p> <p>7 Figure 13, was marked for</p> <p>8 identification.)</p> <p>9 MS. do AMARAL: And, Counsel,</p> <p>10 that's 3D?</p> <p>11 MR. ESSIG: 3D, yes.</p> <p>12 Q. Professor Keyes, is it fair</p> <p>13 to say that these four spreadsheets that</p> <p>14 were produced to us represent the whole</p> <p>15 of the calculations that were performed</p> <p>16 related to your report in this case?</p> <p>17 MS. do AMARAL: Objection.</p> <p>18 A. Yes, I believe so.</p> <p>19 Q. Okay. And we'll ask some</p> <p>20 very specific questions about these as we</p> <p>21 go along later.</p> <p>22 But in terms of the inputting of</p> <p>23 the data here and the calculations that</p> <p>24 are performed, did you yourself do any of</p>	<p style="text-align: right;">Page 53</p> <p>1 Q. And you're under oath.</p> <p>2 At the break, we were handed</p> <p>3 additional invoices that we did not get</p> <p>4 previously. And I've marked this as</p> <p>5 Exhibit 2A to your deposition.</p> <p>6 (Deposition Exhibit Keyes 2A,</p> <p>7 six additional pages of invoices</p> <p>8 produced by Dr. Keyes in the Cobb</p> <p>9 County matter delivered during</p> <p>10 the deposition, was marked for</p> <p>11 identification.)</p> <p>12 Q. Do you have that in front of</p> <p>13 you?</p> <p>14 A. I do.</p> <p>15 Q. Okay. And do these six pages</p> <p>16 of invoices from you and Ms. Rutherford</p> <p>17 reflect the totality combined with</p> <p>18 Exhibit 2 of the invoices that you've</p> <p>19 issued in the case thus far?</p> <p>20 A. I believe so.</p> <p>21 Q. Okay. With that understanding,</p> <p>22 it looks like you issued an invoice on</p> <p>23 September 30th of 2023 -- actually, I</p> <p>24 have this out of order -- and then</p>

<p style="text-align: right;">Page 54</p> <p>1 there's September 1st of 2023 and 2 January 30th of 2024; is that right? 3 A. Yes. 4 Q. Okay. And if you add up the 5 hours that you billed on the invoices, 6 that reflects 21 additional hours of work 7 in Track 8; is that right? 8 A. I have not done the 9 calculation, but I believe you. 10 Q. Simple math, I guess, right? 11 A. Yes. 12 Q. Okay. And if you add the 21 13 to the 25, in Exhibit 2A, that would be 14 46 hours of work that you billed for in 15 this case thus far; is that right? 16 A. Yes. 17 Q. Okay. And for these three 18 invoices, all of the time listed as for 19 the report with the exception of 2 half 20 hour meetings on 9/12 and 9/14 of 2023 on 21 the first page and then an hour meeting 22 on the second page that was 8/23/2023. 23 Do you see that? 24 A. I do.</p>	<p style="text-align: right;">Page 56</p> <p>1 Q. Okay. And so, if you add 2 that 34,450 to the prior amounts that you 3 billed in the opioid litigation, what 4 would be your updated estimate as to how 5 much you billed in the opioid litigation 6 to date? 7 A. My estimate was inclusive -- 8 like, my estimate was inclusive of all 9 the invoices total that I've submitted. 10 So it would be in the same range. 11 Q. \$350,000? 12 A. I think -- 13 MS. do AMARAL: Objection, 14 misstates her testimony. 15 A. Yeah, I think it -- I think, 16 it's in the range of between 350 and 400 17 is what I previously stated, so somewhere 18 in that ballpark. 19 Q. Alright. In what year, in 20 your opinion, did the opioid epidemic 21 begin in Cobb County? 22 MS. do AMARAL: Objection, 23 vague. 24 A. I would like to refer to my</p>
<p style="text-align: right;">Page 55</p> <p>1 Q. Okay. So, if we add up the 2 two sets of invoices in Exhibit 2 in 3 exhibit Keyes 2A, it looks like the time 4 you billed reflects 39 hours for report, 5 6 hours for meetings and 1 hour for 6 review of materials. 7 Does that seem about right to you? 8 A. It seems about right. I 9 haven't done the math, but I trust you. 10 Q. Okay. And then additionally 11 here in Exhibit 2A, we have three more 12 invoices for Ms. Rutherford's time at 13 \$200 an hour and she's billed out a total 14 of \$1300 in total additionally. 15 Does that seem right to you? 16 A. That seems about right. 17 Q. And then if we do the math 18 from your two sets of invoices in Keyes 2 19 and Keyes 2A and for Ms. Rutherford, you 20 get a grand total to date in Track 8 of 21 \$34,450. 22 Does that seem about right to you? 23 A. Again, I haven't done the 24 math, but that seems in the ballpark.</p>	<p style="text-align: right;">Page 57</p> <p>1 report to answer that question. 2 So, in my report, what I have 3 produced is the trends in overdose deaths 4 including opioid overdoses deaths in Cobb 5 County beginning in 1999. And already in 6 that time period, you can see increases 7 in opioid overdose deaths. 8 So, based on the CDC Wonder data, 9 we -- what I can state is that there is 10 evidence of an increase in overdose, at 11 least, in the -- starting in 1999. 12 Q. And your opinion is 13 extrapolated from national data, such as 14 the CDC Wonder database that you 15 reviewed, correct? 16 A. The data in Figure 5 that I 17 was just discussing is based on national 18 data and data from Georgia going back to 19 1999 and it includes Cobb County data 20 starting in 2015. 21 Q. Okay. Do you know when Cobb 22 County began tracking drug overdose 23 deaths? 24 A. No. I mean, they I would</p>

<p style="text-align: right;">Page 58</p> <p>1 assume have been contributing their vital 2 statistics data for many years. 3 Q. Do you know when Cobb County 4 began attributing drug overdose deaths to 5 use of specific substances? 6 MS. do AMARAL: Objection, 7 vague. 8 A. What I have in my report is 9 -- relies on the CDC Wonder Data. So any 10 process that is involved in Cobb County 11 that is outside of the CDC Wonder Data, I 12 have not reviewed. 13 Q. Do you know when Christopher 14 Gullledge became the Chief Medical 15 Examiner of Cobb County? 16 A. I believe I state something 17 about that in the report. 18 Since 2015 is what I have in my 19 report. 20 Q. Okay. And you've referred 21 Mr. Gullledge's deposition in this case, 22 correct? 23 A. Yes. 24 Q. And you spoke to him on the</p>	<p style="text-align: right;">Page 60</p> <p>1 there is no way to discern from the data 2 published in the Cobb County Medical 3 Examiner's annual report whether someone 4 with documented as having died from a 5 prescription drug opioid overdose had 6 either legally or illegally obtained that 7 opioid? 8 A. That is correct. That is not 9 in the Cobb County Medical Examiner's 10 annual report. 11 Q. And you've reviewed the Cobb 12 County Medical Examiner's annual reports 13 from 2015 through 2020, as part of your 14 work in this case; is that correct? 15 A. Yes. 16 Q. Okay. Do you recall that the 17 Cobb County Medical Examiner's annual 18 report for 2015 showed that fentanyl was 19 the most commonly implicated drug in 20 overdose deaths? 21 A. Do you have the report? I 22 have -- I reviewed it some time ago. So 23 I don't recall, specifically, what the 24 2015 report said about fentanyl.</p>
<p style="text-align: right;">Page 59</p> <p>1 phone, at least, what, two or three 2 times? 3 A. Something in that ballpark. 4 Q. Okay. Do you recall he 5 testified in his August 31st, 2022 6 deposition that there's no way to discern 7 from the data published in the Cobb 8 County Medical Examiner's annual report 9 whether a prescription opioid was part of 10 a multidrug death? 11 A. Since 2015, which is the data 12 that I included for Cobb County here, I 13 believe, that you can tell that from the 14 CDC Wonder Data. 15 Q. I asked regarding the Cobb 16 County Medical Examiner's annual reports. 17 A. I apologize. 18 I have reviewed the Cobb County 19 Medical Examiner's annual report and they 20 do not specify prescription opioid 21 overdose deaths, from my understanding, 22 in the Medical Examiner's report. 23 Q. And, similarly, do you recall 24 that he testified in his deposition that</p>	<p style="text-align: right;">Page 61</p> <p>1 Q. Okay. 2 A. I would be happy to look at 3 it, if you have a copy. 4 Q. Maybe we'll get that at a 5 break. 6 Similar questions, do you recall 7 that the Cobb County Medical Examiner's 8 annual report for 2016, 2017 and 2020 9 also showed fentanyl was the mostly 10 commonly implicated drug in overdose 11 deaths? 12 A. I would need to see the 13 annual report, in order to confirm that 14 statement. 15 Q. Okay. And do you recall in 16 2018 heroin was the mostly commonly 17 implicated drug in the overdose deaths in 18 the Cobb County Medical Examiner's annual 19 report? 20 A. Again, I would need to see 21 the report. 22 Q. Okay, last one. 23 Do you recall that the Cobb County 24 Medical Examiner's annual report for 2019</p>

<p style="text-align: right;">Page 62</p> <p>1 showed this methamphetamine was the</p> <p>2 commonly implicated drug in overdose</p> <p>3 deaths?</p> <p>4 A. I would need to see the</p> <p>5 report in order to testify about its</p> <p>6 contents.</p> <p>7 Q. Okay. Based on your review</p> <p>8 previously of the Cobb County Medical</p> <p>9 Examiner's annual reports for those</p> <p>10 years, would you agree that prescription</p> <p>11 opioids were not found to be the mostly</p> <p>12 implicated drug in overdose deaths in</p> <p>13 Cobb County in any of those years we just</p> <p>14 mentioned?</p> <p>15 MS. do AMARAL: Objection,</p> <p>16 vague.</p> <p>17 A. Again, without reviewing the</p> <p>18 reports, I would not -- if I don't have</p> <p>19 the reports in front of me, I can't</p> <p>20 testify what they say.</p> <p>21 Q. Okay. Well, let's turn to</p> <p>22 your report. I'd like to start in</p> <p>23 Schedule A, which is the Cobb County</p> <p>24 specific section.</p>	<p style="text-align: right;">Page 64</p> <p>1 A. Yes.</p> <p>2 Q. So almost one-third of the</p> <p>3 counties in the US had a higher overdose</p> <p>4 death rate in the last ten years than</p> <p>5 Cobb County; is that fair to say?</p> <p>6 That's what you wrote, right?</p> <p>7 A. It's in the top 900 counties.</p> <p>8 So, I think, you are assuming in that</p> <p>9 calculation that it is No. 900. But I</p> <p>10 think we would need to review the</p> <p>11 placement year to year in order to know</p> <p>12 what percentage of counties have a higher</p> <p>13 drug overdose rate by year.</p> <p>14 Q. Alright. Can you quantify</p> <p>15 with reference to a threshold number or</p> <p>16 percentage or any way you can quantify it</p> <p>17 as to when a high rate becomes</p> <p>18 "tremendously high"?</p> <p>19 A. I would say if you look at</p> <p>20 the trend over time and it's increasing</p> <p>21 rapidly, that the -- that the word</p> <p>22 "tremendously" is appropriate.</p> <p>23 Q. Is there any consensus in the</p> <p>24 epidemiology community as to how to make</p>
<p style="text-align: right;">Page 63</p> <p>1 Do you have that in front of you?</p> <p>2 A. Yes.</p> <p>3 Q. Okay. So, in Paragraph 13 of</p> <p>4 your report on Page 1 of Schedule A, you</p> <p>5 wrote in the last sentence of Paragraph</p> <p>6 13, "There have been and remain</p> <p>7 tremendously high rates of overdose death</p> <p>8 and opioid overdose in Cobb County</p> <p>9 supported by local data and confirmed</p> <p>10 with local experts."</p> <p>11 Did I read that correctly?</p> <p>12 A. You did.</p> <p>13 Q. Is "tremendously high" a</p> <p>14 descriptor that you've used in your</p> <p>15 academic writing?</p> <p>16 A. I can't say -- I've published</p> <p>17 400 academic articles. I'm sure I've</p> <p>18 used the word "tremendously."</p> <p>19 Q. And in the prior sentence you</p> <p>20 wrote, "Cobb County has been among the</p> <p>21 top 900 counties out of over 3,000 in the</p> <p>22 nation with the highest overdose death</p> <p>23 rates for the last ten out of ten years."</p> <p>24 Did I read that correctly?</p>	<p style="text-align: right;">Page 65</p> <p>1 that determination as to when something</p> <p>2 is becoming "tremendously high" rate?</p> <p>3 A. My opinion is that any</p> <p>4 qualified epidemiologist who read this</p> <p>5 report would agree that the rate of</p> <p>6 overdose death is "tremendously high."</p> <p>7 Q. At the bottom of this page,</p> <p>8 in the next section, the sentence that</p> <p>9 starts right at the end of the Page 1.</p> <p>10 It says, "these sources," and then we</p> <p>11 turn to Page 2, "document an exceptionally</p> <p>12 high burden of harm in this county, well</p> <p>13 beyond mortality including ongoing</p> <p>14 morbidity from opioid use."</p> <p>15 Did I read that correctly?</p> <p>16 A. Yes.</p> <p>17 Q. Is "exceptionally high" a</p> <p>18 descriptor that you use in your academic</p> <p>19 writing?</p> <p>20 A. Yes.</p> <p>21 Q. And can you quantify with</p> <p>22 reference to any sort of number or</p> <p>23 threshold as to when a high rate becomes</p> <p>24 "exceptionally high"?</p>

<p style="text-align: right;">Page 66</p> <p>1 A. Yes, that is a statistical 2 procedure that we use. It's based on 3 expectation. So, if something is 4 "exceptionally high," it's beyond that 5 which would be expected, based on a set 6 of averages. 7 Q. Okay. And is there a 8 numerical threshold for a rate when 9 something is high and then it becomes 10 "exceptionally high"? 11 A. Again, it would -- it would 12 be dependent on the expectation that you 13 used for comparison. 14 Q. Okay. And is there a 15 consensus in the epidemiology community 16 as to how to make a determination when a 17 rate is "exceptionally high," as opposed 18 to high? 19 A. Yes. In statistics, you 20 would set -- you calculate the 21 expectation and when something is above 22 the expected value, then it would be 23 "exceptionally high." 24 Q. And -- cause I'm confused,</p>	<p style="text-align: right;">Page 68</p> <p>1 Q. No, it's the sentence that -- 2 I'm sorry. Paragraph 14, the sentence 3 starts with, "Data from Georgia." 4 Do you see that? 5 A. Yes. 6 Q. And then after the semicolon, 7 you have a phrase -- yeah, we're in the 8 same page, right, same place? 9 A. I think we're in the same 10 place. 11 Q. Okay. Yes, thank you. 12 Can you quantify in any numerical 13 fashion how many opioids or -- were 14 oversupplied in Georgia in that time 15 frame? 16 A. Yes. I discuss that in both 17 the -- in the general report in some 18 detail, but there are a number of studies 19 that have estimated oversupply and that 20 would generalize to Georgia and have used 21 Georgia data. 22 Q. Okay. And you haven't 23 offered any opinions in your report with 24 regard to specific amounts of opioids</p>
<p style="text-align: right;">Page 67</p> <p>1 just let me try it a different way. 2 Does the descriptor "exceptionally 3 high" refer to a larger quantity or rate 4 than the descriptor "tremendously high"? 5 A. Those are two different 6 words. 7 I'm not understanding the question. 8 Q. Sure. I guess, if, you know, 9 there's a high rate of something and then 10 you have an "exceptionally high" rate and 11 a "tremendously high" rate. 12 So which is higher, "exceptionally" 13 or "tremendously"? 14 A. They both are quite high. 15 Q. Okay. Let me go back to your 16 Paragraph 14 on Page 1. And you refer to 17 -- in Paragraph 14, "the oversupply of 18 prescription opioids that began in the 19 1990s and continues to the present time." 20 Do you see that? It's in the first 21 sentence at the end. 22 A. The sentence that starts 23 with, "The increase in fentanyl mortality 24 deaths can be linked to" --</p>	<p style="text-align: right;">Page 69</p> <p>1 that you would contend were oversupplied 2 by Publix, correct? 3 A. I have offered in the report 4 opinions that are specific to Publix in 5 that the data that has been used to 6 generate the opinions includes Publix's 7 data and is generalizable to the region. 8 So I would say my opinions are specific 9 to Publix. 10 Q. Well, let me ask it a 11 different way. 12 Either in your report or in the data 13 in the spreadsheets that you provided, 14 you haven't done any data analysis 15 specific to Publix's prescription data, 16 as to whether Publix' oversupply of 17 opioids in Cobb, correct, other experts 18 have done that but you haven't? 19 A. Again, I believe, that the 20 analysis that I've included in this 21 report does include analyses that are 22 specific to Publix prescription data, as 23 they are included in the datasets, as is 24 Cobb County.</p>

<p style="text-align: right;">Page 70</p> <p>1 So I believe that analysis is</p> <p>2 included in my opinions.</p> <p>3 Q. Okay. And I understand that</p> <p>4 you've reviewed generalized mass</p> <p>5 prescription data in regard to opioid</p> <p>6 prescribing, right?</p> <p>7 MS. do AMARAL: Objection,</p> <p>8 vague.</p> <p>9 A. Yeah, that's -- that's not how</p> <p>10 I would describe the data that I used.</p> <p>11 Q. Okay. Well you -- let me try</p> <p>12 it one more time.</p> <p>13 You haven't reviewed any data</p> <p>14 provided by Publix specific to this</p> <p>15 litigation regarding opioid supply as</p> <p>16 part of your work in this case, correct?</p> <p>17 A. Publix supplies data to --</p> <p>18 Q. No, no, I'm not asking that</p> <p>19 way.</p> <p>20 I'm asking about any data that</p> <p>21 Publix produced in the litigation with a</p> <p>22 Publix Bate Stamp.</p> <p>23 Those kinds of documents, you</p> <p>24 haven't reviewed those, correct?</p>	<p style="text-align: right;">Page 72</p> <p>1 correct?</p> <p>2 A. Yes.</p> <p>3 Q. Okay. And so my question is</p> <p>4 do you have an overall opinion about what</p> <p>5 percentage of people who have come into</p> <p>6 contact with opioids in any fashion in</p> <p>7 Cobb County who have been adversely</p> <p>8 impacted?</p> <p>9 MS. do AMARAL: Objection,</p> <p>10 vague.</p> <p>11 A. So do you mean -- "come into</p> <p>12 contact with"? So anyone who takes any</p> <p>13 opioid of any kind ever in their life; is</p> <p>14 that...</p> <p>15 Q. You can answer it that way,</p> <p>16 sure.</p> <p>17 A. I guess, I'm asking -- I'd</p> <p>18 like some more clarification on what you</p> <p>19 mean by, "come into contact with an</p> <p>20 opioid," if that's possible.</p> <p>21 Q. Okay. Let me try it this</p> <p>22 way.</p> <p>23 Do you have an opinion on what</p> <p>24 percentage of individuals who were</p>
<p style="text-align: right;">Page 71</p> <p>1 A. I have not reviewed a document</p> <p>2 with a Publix Bate Stamp. However,</p> <p>3 Publix --</p> <p>4 Q. Yes, that's fair.</p> <p>5 A. -- contributes data.</p> <p>6 Q. Alright. Do you have any</p> <p>7 opinions on what percentage of people who</p> <p>8 have come into contact with opioids in</p> <p>9 Cobb County have been adversely impacted?</p> <p>10 MS. do AMARAL: Objection,</p> <p>11 vague.</p> <p>12 A. Could you specify what you</p> <p>13 mean "come into contact with opioids"?</p> <p>14 Q. Sure. Well -- and we'll get</p> <p>15 to in this a little bit.</p> <p>16 But you offer opinions about -- in</p> <p>17 your report -- about opioid users,</p> <p>18 correct?</p> <p>19 A. Yes.</p> <p>20 Q. And you offer opinions in</p> <p>21 your report about children and families</p> <p>22 who may have been impacted by opioids</p> <p>23 with relation to either parents or family</p> <p>24 members who have opioid use disorder,</p>	<p style="text-align: right;">Page 73</p> <p>1 prescribed opioids and used opioids in</p> <p>2 Cobb County who were adversely impacted</p> <p>3 by their use of opioids?</p> <p>4 MS. do AMARAL: Objection,</p> <p>5 vague.</p> <p>6 A. So, in the data that I review</p> <p>7 and the opinions that I've generated, we</p> <p>8 -- I specified that there is a dose</p> <p>9 response relationship between being</p> <p>10 prescribed an opioid and developing</p> <p>11 opioid use disorder and other consequences</p> <p>12 related to opioid use.</p> <p>13 And the studies that I have cited</p> <p>14 in that section would provide an estimate</p> <p>15 for you of the proportion of people in</p> <p>16 Cobb County who were prescribed an opioid</p> <p>17 and were adversely impacted. And we can</p> <p>18 -- I can pull up some of those studies.</p> <p>19 I have some specific references that I</p> <p>20 would pull out in order to generate that</p> <p>21 estimate.</p> <p>22 Q. Okay. Well, let me back up</p> <p>23 then.</p> <p>24 In Paragraph 15 here on Page 1, you</p>

<p style="text-align: right;">Page 74</p> <p>1 wrote that, "In 2021, the last year of 2 data available, I estimate the prevalence 3 of opioid use disorder is, approximately, 4 2.0 percent in Cobb County." 5 Did I read that accurately? 6 A. Yes. 7 Q. Okay. So not everyone whose 8 used an opioid in Cobb County has 9 developed opioid use disorder, can we 10 agree on that? 11 A. That's correct. 12 Q. Okay. In fact, a small 13 percentage or, at least, a 2.0 percent of 14 the population in Cobb County has opioid 15 use disorder, based on your calculations, 16 correct? 17 A. My calculation is that, 18 approximately, 2 percent of the population 19 in that year have opioid use disorder. 20 Q. Do you know about how many 21 individuals filled opioid prescriptions 22 at Publix from 1999 to 2021? 23 A. I have not reviewed those 24 data.</p>	<p style="text-align: right;">Page 76</p> <p>1 whether Publix's opioid prescribing 2 practice and policies injured each and 3 every one of the individuals who filled 4 an opioid prescription at Publix? 5 MS. do AMARAL: Objection, 6 vague, calls for a legal conclusion. 7 A. My opinion is that Publix' 8 opioid prescribing injured the population 9 of Cobb County and the extent to which 10 that injury is prevalent depends on the 11 dose and duration of the prescribing. 12 Q. Would you agree that many 13 individuals who filled opioid 14 prescriptions at Publix between 1999 and 15 2021 for pain or cancer-related pain or 16 other reasons why they were prescribed an 17 opioid benefitted from Publix's opioid 18 prescribing practices and policies? 19 MS. do AMARAL: Objection. 20 A. The epidemiological literature 21 indicates that there is a causal 22 relationship between dose and duration of 23 opioid dispensing and opioid use disorder 24 and other related harms. So that is a</p>
<p style="text-align: right;">Page 75</p> <p>1 Q. Is it your opinion that 2 Publix's opioid prescribing practices and 3 policies injured each and every one of 4 those individuals who filled an opioid 5 prescription at Publix? 6 MS. do AMARAL: Objection, 7 vague. 8 Q. If you have an opinion. 9 A. My opinion is that opioid 10 prescribing contributed to the overall 11 supply of opioids in Cobb County and that 12 that overall supply is causally associated 13 with an increase in opioid-related harm 14 both to the individuals who were exposed 15 to the opioids and their families. So 16 there's a dose response relationship. 17 The more opioids, the more opioid-related 18 harm and that's my opinion. 19 Q. Okay. And that's a general 20 opinion. 21 But my question was specific to 22 Publix. So -- and if you don't have an 23 opinion, that's fine. 24 But do you have an opinion as to</p>	<p style="text-align: right;">Page 77</p> <p>1 causal relationship that has been 2 established in the literature. So I 3 would not agree with your statement. 4 Q. Would you agree that some 5 individuals who filled prescriptions at 6 Publix between 1999 and 2021 for pain or 7 cancer-related pain or other reasons why 8 they were prescribed an opioid benefitted 9 from Publix's opioid prescribing 10 practices and policies? 11 MS. do AMARAL: Objection, 12 vague. 13 A. Again, the epidemiological 14 literature that I reviewed in this report 15 details a significant ongoing and 16 pervasive causal relationship between 17 dose and duration of opioid prescribing 18 and opioid related harm. That is the 19 data and the opinion that I intend to 20 offer. 21 Q. Okay. I'm going to move on. 22 In Figure 2 on Page 2 of your 23 report, you have a graph of opioids 24 prescribed in Morphine milligram</p>

<p style="text-align: right;">Page 78</p> <p>1 equivalents.</p> <p>2 A. Yes.</p> <p>3 Q. And if you look at the graph,</p> <p>4 it appears that opioid prescribing peaked</p> <p>5 in Georgia and in the United States in</p> <p>6 2010; is that correct?</p> <p>7 A. Yes.</p> <p>8 Q. What data did you use to</p> <p>9 generate this graph?</p> <p>10 A. I used the data that are</p> <p>11 referenced in Citation 4. And if you</p> <p>12 that have study, we can look at it in</p> <p>13 more detail. I believe it's the IQVIA</p> <p>14 data.</p> <p>15 Q. And did you or Ms. Rutherford</p> <p>16 prepare the figures that are shown in</p> <p>17 your report?</p> <p>18 A. Ms. Rutherford physically</p> <p>19 produced the figure and I provided the</p> <p>20 data to generate the figures. Or, I</p> <p>21 guess, we collaborated on the data to</p> <p>22 generate the figures.</p> <p>23 Q. Okay. So then I want to move</p> <p>24 onto Page 3 and Figure 4. You've</p>	<p style="text-align: right;">Page 80</p> <p>1 Okay. So 48 counties had a higher</p> <p>2 rate, correct?</p> <p>3 A. During this time period, yes.</p> <p>4 Q. '99 through 2021?</p> <p>5 A. Yes.</p> <p>6 Q. Okay.</p> <p>7 A. And for the counties that are</p> <p>8 reporting. That's another caveat I would</p> <p>9 add to that.</p> <p>10 Q. Alright. So, on the next</p> <p>11 page, Page 4, you make a reference to</p> <p>12 your interview with the Cobb County</p> <p>13 Medical Examiner Dr. Gulledge. We</p> <p>14 discussed that a little bit earlier.</p> <p>15 And he reported to you that prior</p> <p>16 to 2015, there were different coding</p> <p>17 practices in Cobb County for overdose</p> <p>18 deaths, correct?</p> <p>19 A. Yes.</p> <p>20 Q. Do you recall anything with</p> <p>21 regard to what those coding practices</p> <p>22 were and what he told you?</p> <p>23 A. My understanding is that many</p> <p>24 opioid-involved deaths were coded as</p>
<p style="text-align: right;">Page 79</p> <p>1 provided a map of the data by county for</p> <p>2 Georgia over drug deaths -- overdose</p> <p>3 deaths reported to the National Vital</p> <p>4 Statistic Service from 1999 through 2021,</p> <p>5 correct?</p> <p>6 A. Yes.</p> <p>7 Q. And in your discussions to</p> <p>8 the right of the graph, you noted that,</p> <p>9 quote, "Cobb County has the 49th highest</p> <p>10 overdose" rate -- "death rate in the</p> <p>11 state among the 100 reporting counties."</p> <p>12 Did I read that correctly?</p> <p>13 A. Yes.</p> <p>14 Q. Okay. So, for the years</p> <p>15 reported in the study and shown in</p> <p>16 Figure 4, the majority of counties in</p> <p>17 Georgia -- or a majority of counties in</p> <p>18 Georgia had a higher overdose death rate</p> <p>19 than Cobb County did from 1999 through</p> <p>20 2021, correct?</p> <p>21 A. No. The 49th is less than</p> <p>22 the majority, right? 51 counties had</p> <p>23 lower.</p> <p>24 Q. Yeah, you got me there.</p>	<p style="text-align: right;">Page 81</p> <p>1 polysubstance death.</p> <p>2 Q. And...</p> <p>3 Would anyone be able to tell if</p> <p>4 those coding practices led to any kind of</p> <p>5 undercount of opioid-involved deaths</p> <p>6 prior to 2015?</p> <p>7 MS. do AMARAL: Objection,</p> <p>8 calls for speculation.</p> <p>9 A. My opinion is that the data</p> <p>10 -- and what I stated in the report is</p> <p>11 that prior to 2015, the data on specific</p> <p>12 contributors to overdose -- opioid</p> <p>13 overdose deaths are likely undercounted.</p> <p>14 Q. Okay. But because we don't</p> <p>15 have the data, no one can tell for sure</p> <p>16 whether those coding practices led to</p> <p>17 undercounting of opioid-related deaths,</p> <p>18 fair?</p> <p>19 A. We don't have the true codes</p> <p>20 prior to 2015. Or we don't have more</p> <p>21 detail, I guess, on the specific</p> <p>22 contributors to death. So we don't know</p> <p>23 exactly how many were undercounted. But</p> <p>24 it is likely that there was, at least,</p>

<p style="text-align: right;">Page 82</p> <p>1 some undercount.</p> <p>2 Q. Alright. On Page 5 of your</p> <p>3 report, you wrote near the top of the</p> <p>4 page that, "Drugs such as alcohol and</p> <p>5 benzodiazepines interact with opioids to</p> <p>6 increase the risk of death and these</p> <p>7 deaths would not have occurred without</p> <p>8 the presence of opioids."</p> <p>9 Did I read that correctly?</p> <p>10 A. Yes.</p> <p>11 Q. Isn't it an opinion that</p> <p>12 these deaths would not have occurred</p> <p>13 without the presence of opioids a medical</p> <p>14 causation opinion?</p> <p>15 MS. do AMARAL: Objection,</p> <p>16 calls for a legal conclusion.</p> <p>17 A. No, that's an epidemiological</p> <p>18 opinion as well.</p> <p>19 Q. Okay. But you're, certainly,</p> <p>20 aware of deaths caused solely by alcohol</p> <p>21 use or by benzodiazepine use or by</p> <p>22 alcohol and benzodiazepine use in</p> <p>23 combination without opioid use?</p> <p>24 A. Those substances can cause</p>	<p style="text-align: right;">Page 84</p> <p>1 opioid use with prescription opioids?</p> <p>2 A. I think that that is a</p> <p>3 reasonable estimate, yes.</p> <p>4 Q. Okay. Do you have any data</p> <p>5 on that specific to Cobb County?</p> <p>6 A. The data that I have used to</p> <p>7 form that opinion are based on studies</p> <p>8 that have included Cobb County data or</p> <p>9 have included national data including</p> <p>10 contributions from Cobb County.</p> <p>11 Q. Which studies are those?</p> <p>12 A. There are a range of studies.</p> <p>13 The National Study of Drug Use on Health,</p> <p>14 for example, the IQVIA data and other</p> <p>15 studies that are based on national and</p> <p>16 state level data that have included</p> <p>17 Georgia.</p> <p>18 Q. Now, in the sentence I just</p> <p>19 read you, you opine that this phenomenon</p> <p>20 has happened in the last 20 years in Cobb</p> <p>21 County and -- as opposed to 25 years in</p> <p>22 the United States, which is what you</p> <p>23 opined on this phenomena on Page 40 in</p> <p>24 your generic report.</p>
<p style="text-align: right;">Page 83</p> <p>1 death. When those substances are</p> <p>2 combined with opioids, it accelerates the</p> <p>3 probability of a death.</p> <p>4 Q. And either way you're not a</p> <p>5 medical doctor, correct?</p> <p>6 A. I am not a medical doctor. I</p> <p>7 have included my opinions based on the</p> <p>8 epidemiological literature.</p> <p>9 Q. Okay. Also, on Page 5 here</p> <p>10 you state that, quote -- this is in the</p> <p>11 middle sort of the second paragraph there</p> <p>12 -- "Sufficient evidence to conclude that</p> <p>13 prescription opioid use is a cause of</p> <p>14 heroin and fentanyl use and,</p> <p>15 approximately, 70 to 80 percent of</p> <p>16 individuals who use heroin in the last</p> <p>17 20 years begin with prescription</p> <p>18 opioids."</p> <p>19 Did I read that correctly?</p> <p>20 A. Yes.</p> <p>21 Q. So is it your opinion that 70</p> <p>22 to 80 percent of individuals in Cobb</p> <p>23 County who used heroin since 2004 began</p> <p>24 with prescription opioids -- began their</p>	<p style="text-align: right;">Page 85</p> <p>1 Is there a difference between Cobb</p> <p>2 County and the United States in terms of</p> <p>3 the duration of this phenomenon?</p> <p>4 A. No.</p> <p>5 Q. In your Track 8 generic</p> <p>6 report on Page 40 there, you change the</p> <p>7 opinion up to 25 years from the 20 years</p> <p>8 you had used in your Track 7 report.</p> <p>9 Was this a reference to 20 here on</p> <p>10 Page 5 in Schedule A something that just</p> <p>11 didn't get updated when you updated the</p> <p>12 rest of your Schedule A report?</p> <p>13 MS. do AMARAL: Objection,</p> <p>14 asked and answered.</p> <p>15 A. Yes.</p> <p>16 Q. Okay. I want to ask some</p> <p>17 questions about Figure 7 and the</p> <p>18 calculations that you did to get to it.</p> <p>19 Do you have that in front of you?</p> <p>20 A. I have Figure 7.</p> <p>21 And do you want me to have one of</p> <p>22 these spreadsheets?</p> <p>23 Q. Yes, I'll direct you in a</p> <p>24 second.</p>

<p style="text-align: right;">Page 86</p> <p>1 A. Okay.</p> <p>2 Q. What does Figure 7 shows?</p> <p>3 A. Figure 7 shows overdose death</p> <p>4 rates from natural and semi-synthetic</p> <p>5 opioids from 1999 through 2021.</p> <p>6 Q. And where does the data in</p> <p>7 Figure 7 comes from?</p> <p>8 A. The National Vital Statistics</p> <p>9 System.</p> <p>10 Q. Okay. Let's take a look at</p> <p>11 the big one, which we've marked as</p> <p>12 Exhibit 3A. This the Excel spreadsheet</p> <p>13 that you produced before the deposition</p> <p>14 that's labeled Figure 7 and Figure 14.</p> <p>15 A. They're not labeled on my</p> <p>16 spreadsheets so...</p> <p>17 Q. Right. I'm representing to</p> <p>18 you that 3A, the big one --</p> <p>19 A. The big one, okay.</p> <p>20 Q. Right.</p> <p>21 On the spreadsheet that you</p> <p>22 produced, the tab says this is for Figure</p> <p>23 7 and for Figure 14.</p> <p>24 A. Okay.</p>	<p style="text-align: right;">Page 88</p> <p>1 deaths that were coded as T40.2, T40.3 or</p> <p>2 T40.4.</p> <p>3 Q. And that's coded that way</p> <p>4 where?</p> <p>5 A. In the National Vital</p> <p>6 Statistics System.</p> <p>7 Q. Okay. And so you have that</p> <p>8 data nationally in Lines 3 to 25, correct?</p> <p>9 A. Yes.</p> <p>10 Q. And then you have it for</p> <p>11 Georgia in 26 to 48, correct?</p> <p>12 A. Yes.</p> <p>13 Q. Okay. And then beginning on</p> <p>14 Line 49 for Cobb County, we have NA for</p> <p>15 1999, 2000 and 2001.</p> <p>16 Do you see that?</p> <p>17 A. Yes.</p> <p>18 Q. Okay. And then for some</p> <p>19 reason, in 2002, you have 11 deaths.</p> <p>20 Do you know where that data came</p> <p>21 from?</p> <p>22 A. The National Vital Statistics</p> <p>23 System.</p> <p>24 Q. So what does "NA" mean in the</p>
<p style="text-align: right;">Page 87</p> <p>1 Q. Okay. So, on the left here</p> <p>2 of the spreadsheet, Lines 3 to 25, those</p> <p>3 are national calculations that you did --</p> <p>4 A. Yes.</p> <p>5 Q. -- from 1999 to 2021?</p> <p>6 A. Yes.</p> <p>7 Q. And Lines 26 to 48 are for</p> <p>8 Georgia; is that right?</p> <p>9 A. Yes.</p> <p>10 Q. And Lines 49 to 71 are for</p> <p>11 Cobb County; is that right?</p> <p>12 A. Yes.</p> <p>13 Q. Okay. And did you prepare</p> <p>14 this spreadsheet or did Ms. Rutherford?</p> <p>15 A. We collaborated on it.</p> <p>16 Q. And what's the nature of the</p> <p>17 collaboration? How does that work?</p> <p>18 A. We both work on the document</p> <p>19 to fill in the numbers and work on the</p> <p>20 formulas.</p> <p>21 Q. Okay. So, if we go across</p> <p>22 horizontally, the D and E boxes that you</p> <p>23 have here represent what?</p> <p>24 A. These are the number of</p>	<p style="text-align: right;">Page 89</p> <p>1 boxes for Cobb County?</p> <p>2 A. The reporting guidelines for</p> <p>3 the data are that you don't report on</p> <p>4 death numbers that are ten or lower.</p> <p>5 Q. Okay. So that would represent</p> <p>6 that, for example, in 1999 in Cobb</p> <p>7 County, there were less than ten deaths</p> <p>8 that were coded related to opioids that</p> <p>9 had the codes 40.2, 40.3 and 40.4; is</p> <p>10 that right?</p> <p>11 A. Ten or less.</p> <p>12 Q. Ten or less?</p> <p>13 A. Yeah.</p> <p>14 Q. Okay. Fair enough.</p> <p>15 And similarly, you have more NAs</p> <p>16 for 2003, 2005, 2006 and 2007; is that</p> <p>17 right?</p> <p>18 A. Yes.</p> <p>19 Q. Okay. What are the crude</p> <p>20 rates that are shown in Boxes E and G?</p> <p>21 What is that calculation?</p> <p>22 A. That is the rate of death</p> <p>23 based on those T codes. So that's the</p> <p>24 number of deaths divided by the</p>

<p style="text-align: right;">Page 90</p> <p>1 population size.</p> <p>2 Q. And then in Box H, the header</p> <p>3 says it's the codes for T42 through T44</p> <p>4 minus T40.2 and T40.3, deaths that had</p> <p>5 only T40.4 is a "contributing</p> <p>6 prescription opioid."</p> <p>7 Did I read that accurately?</p> <p>8 A. Yes.</p> <p>9 Q. Explain that for us. What</p> <p>10 does that mean?</p> <p>11 A. So we wanted to isolate the</p> <p>12 deaths that only had T40.4 out of those</p> <p>13 three T codes. And I -- to explain more</p> <p>14 accurately, so many -- so deaths that are</p> <p>15 coded as T40.2 or T40.3 could also have a</p> <p>16 T40.4 code. So we wanted to isolate only</p> <p>17 those deaths that only had the T40.4</p> <p>18 codes of those three codes.</p> <p>19 Q. And T40.4 is for a synthetic</p> <p>20 opioid and it's predominantly fentanyl,</p> <p>21 correct?</p> <p>22 A. It is synthetic opioids and</p> <p>23 fentanyl does contribute to that T code.</p> <p>24 Q. What calculation did you do</p>	<p style="text-align: right;">Page 92</p> <p>1 60,957 deaths, correct?</p> <p>2 A. Yes.</p> <p>3 Q. But for whatever reason from</p> <p>4 2013 on you're not calculating the</p> <p>5 percentage of the opioid deaths that</p> <p>6 relate to fentanyl use, correct?</p> <p>7 A. No, there is a reason.</p> <p>8 MS. do AMARAL: Objection.</p> <p>9 Q. And what is that reason?</p> <p>10 A. Because the purpose of Column</p> <p>11 I is to estimate the proportion of deaths</p> <p>12 prior to the elicited fentanyl epidemic for</p> <p>13 which prescription synthetic opioids were</p> <p>14 killing people in the population.</p> <p>15 Q. Okay. So then if we look in</p> <p>16 Box D at Line 16 for 2013 nationally --</p> <p>17 are you with me?</p> <p>18 A. Line 16/Column D.</p> <p>19 Q. Right.</p> <p>20 So, for that column, you have</p> <p>21 16,007 deaths, correct?</p> <p>22 A. Yes.</p> <p>23 Q. And in Column J now, which is</p> <p>24 your estimated number of Rx opioid</p>
<p style="text-align: right;">Page 91</p> <p>1 to get the data in the "I" boxes?</p> <p>2 A. The "I" box is the percentage</p> <p>3 of deaths that were of those three codes</p> <p>4 that only had T40.4 as their contributing</p> <p>5 code of those three. So, for example, in</p> <p>6 Row 3 about 14.6 percent of the 588</p> <p>7 deaths that had one of those three codes</p> <p>8 had only T40.4 as the contributing code.</p> <p>9 Q. So then in 2013 or beginning</p> <p>10 in 2013 beginning, in Box 17, there is no</p> <p>11 figure in Box I.</p> <p>12 Why is that?</p> <p>13 A. Because we used the percentage</p> <p>14 of deaths that had T40.4 as their only</p> <p>15 contributing code as an input calculation</p> <p>16 for our -- for other analyses that we</p> <p>17 did. We were interested in the</p> <p>18 pre-fentanyl epidemic proportion of</p> <p>19 deaths that -- for which synthetic</p> <p>20 opioids were killing people.</p> <p>21 Q. So then even though in 2013,</p> <p>22 in the national data in Box H at Line 17,</p> <p>23 there is no 2,090 deaths there and then</p> <p>24 by 2021 in Line 25 in Box H there is</p>	<p style="text-align: right;">Page 93</p> <p>1 overdose deaths, that also -- for Line 16</p> <p>2 for 2012 nationally also reads 16,007</p> <p>3 deaths, correct?</p> <p>4 A. Yes.</p> <p>5 Q. Is it your calculation in J</p> <p>6 that all of those opioid deaths in 2012</p> <p>7 are related to prescription opioid</p> <p>8 overdoses?</p> <p>9 A. Those are the number of</p> <p>10 deaths that were coded as T40.2, T40.3</p> <p>11 and T40.4.</p> <p>12 Q. Okay. So let me go down with</p> <p>13 you to Line 25.</p> <p>14 For 2021, in Box D, you've got</p> <p>15 77,663 deaths listed, correct?</p> <p>16 A. Yes.</p> <p>17 Q. But in Box J, for the</p> <p>18 estimated number of Rx opioid overdose</p> <p>19 deaths, in that column, you only have</p> <p>20 18,111, correct?</p> <p>21 A. That's correct.</p> <p>22 Q. And that's because so many</p> <p>23 more deaths -- and we can do the math --</p> <p>24 are now attributed as fentanyl deaths,</p>

<p style="text-align: right;">Page 94</p> <p>1 correct?</p> <p>2 MS. do AMARAL: Objection,</p> <p>3 vague.</p> <p>4 A. So that is a correction to</p> <p>5 estimate the number of -- to remove the</p> <p>6 number of deaths that are likely due to</p> <p>7 illicitly manufactured fentanyl.</p> <p>8 Prescription fentanyl is still killing</p> <p>9 people too. And so that is the estimate</p> <p>10 of the prescription fentanyl contribution.</p> <p>11 Q. Okay.</p> <p>12 Alright. So now for Cobb County</p> <p>13 only, you have data in Columns K, L, M</p> <p>14 and N, correct?</p> <p>15 A. Correct.</p> <p>16 Q. Why only for Cobb County in</p> <p>17 those columns?</p> <p>18 A. We were interested in -- I</p> <p>19 was interested in reporting the deaths</p> <p>20 due to prescription opioids in Cobb</p> <p>21 County because that's the topic of the</p> <p>22 report.</p> <p>23 Q. Okay. And so where is the</p> <p>24 data in Columns K through N coming from?</p>	<p style="text-align: right;">Page 96</p> <p>1 MS. do AMARAL: "K."</p> <p>2 Q. I'm sorry, K through N.</p> <p>3 A. The sources of the data</p> <p>4 transaction are the National Vital</p> <p>5 Statistics System and outside estimates</p> <p>6 that we use for adjustment.</p> <p>7 Q. Okay. So there's no Cobb</p> <p>8 County Medical Examiner annual report</p> <p>9 data contained in K through N; is that</p> <p>10 fair?</p> <p>11 A. The data are drawn from the</p> <p>12 National Vital Statistics System, which</p> <p>13 are consistent with the Cobb County</p> <p>14 Medical Examiner report in magnitude and</p> <p>15 trend.</p> <p>16 Q. Okay. So, just a few more</p> <p>17 questions here.</p> <p>18 So Line 49, 1999 Cobb County, all</p> <p>19 of these columns about death related to</p> <p>20 opioids from K through N are "NA,"</p> <p>21 meaning, they were ten or fewer recorded;</p> <p>22 is that right?</p> <p>23 A. Yes.</p> <p>24 Q. Okay. So, then in Line 54 --</p>
<p style="text-align: right;">Page 95</p> <p>1 A. They are outputs of the other</p> <p>2 columns in the spreadsheet, as well as</p> <p>3 outside estimates that we used</p> <p>4 adjustments.</p> <p>5 Q. When you say, "outside</p> <p>6 estimates that you used for adjustments,"</p> <p>7 what does that mean?</p> <p>8 A. So, for example, in Column N,</p> <p>9 the deaths due to nonprescription opioids</p> <p>10 that are attributable to prescription</p> <p>11 opioids, we use why a peer reviewed</p> <p>12 method from an academic publication.</p> <p>13 Q. So that's your Larney</p> <p>14 calculation; is that right?</p> <p>15 A. No, that's a different --</p> <p>16 Q. Okay. Well, we'll get to</p> <p>17 that later.</p> <p>18 A. -- thing altogether.</p> <p>19 Q. Okay. Then I'm confused.</p> <p>20 I'm jumping ahead.</p> <p>21 Alright. So I didn't think I heard</p> <p>22 in that answer the source of the data</p> <p>23 from Columns X through N.</p> <p>24 A. K through N.</p>	<p style="text-align: right;">Page 97</p> <p>1 I think it's 54 -- yeah, 54, for 2004,</p> <p>2 for some reason now you have 14 deaths in</p> <p>3 K, 11 deaths in L, 3 deaths in M and 2</p> <p>4 deaths in N.</p> <p>5 Do you see that?</p> <p>6 A. Yes.</p> <p>7 Q. Do you know how you got</p> <p>8 specific death numbers for 2004 that are</p> <p>9 at ten or under?</p> <p>10 A. Because they're based on</p> <p>11 estimates that we did.</p> <p>12 Q. Okay.</p> <p>13 Alright. So then I want to direct</p> <p>14 your attention to the last number here</p> <p>15 for 2021 in Line 71.</p> <p>16 Do you have that in front of you?</p> <p>17 A. Yes.</p> <p>18 Q. Okay. So you're showing 129</p> <p>19 deaths due to opioids recorded in Cobb</p> <p>20 County in Line -- in Column K; is that</p> <p>21 right?</p> <p>22 A. That's correct.</p> <p>23 Q. Fifty-six of those are listed</p> <p>24 in L as deaths due directly to Rx</p>

<p style="text-align: right;">Page 98</p> <p>1 opoids; is that right?</p> <p>2 A. Yes.</p> <p>3 Q. And who was making that</p> <p>4 determination?</p> <p>5 A. That is based on what T codes</p> <p>6 are listed on the death certificate. So</p> <p>7 it comes from the Medical Examiner's</p> <p>8 office.</p> <p>9 Q. Okay. And then in Column M,</p> <p>10 it says, "deaths to nonprescription</p> <p>11 opoids," and there's 73.</p> <p>12 Do you see that?</p> <p>13 A. Yes.</p> <p>14 Q. And, again, who is making</p> <p>15 that determination that those deaths were</p> <p>16 due to nonprescription opoids?</p> <p>17 A. Again, it's based on the T</p> <p>18 codes that are listed on the death</p> <p>19 certificate.</p> <p>20 Q. And then in Column N, you</p> <p>21 have 39 down for -- in Column N it's</p> <p>22 described as "death due to non-Rx opoids</p> <p>23 attributable to Rx opoids."</p> <p>24 A. Yes.</p>	<p style="text-align: right;">Page 100</p> <p>1 A. Well, it's not a belief. I'm</p> <p>2 relying on academic literature to make</p> <p>3 that determination based on my expertise.</p> <p>4 Q. Okay. Oh, yeah, last question</p> <p>5 on this, I think.</p> <p>6 In Row O here, you're making -- you</p> <p>7 providing what's called an "Estimated</p> <p>8 Crude Rate of Rx opioid overdose deaths."</p> <p>9 Do you see that?</p> <p>10 A. Yes.</p> <p>11 Q. And how was that rate</p> <p>12 calculated?</p> <p>13 A. That is based on the number</p> <p>14 of deaths that are attributable -- that I</p> <p>15 estimate are attributable to prescription</p> <p>16 opoids divided by the population size.</p> <p>17 Q. Based on your calculations</p> <p>18 with your technique that you've described</p> <p>19 earlier?</p> <p>20 A. Which "technique"?</p> <p>21 Q. Forget it. I'll move on.</p> <p>22 A. Okay.</p> <p>23 Q. Okay. And so the -- forget</p> <p>24 it. I think I'm done with that exhibit.</p>
<p style="text-align: right;">Page 99</p> <p>1 Q. What does that mean?</p> <p>2 A. That is based on the peer</p> <p>3 reviewed method that I spoke about</p> <p>4 earlier. It's a Cerda study that is</p> <p>5 cited in the report.</p> <p>6 Q. Okay. So that's a</p> <p>7 calculation or is it an estimation that</p> <p>8 you've made?</p> <p>9 A. That is an estimation that</p> <p>10 I've made.</p> <p>11 Q. And that's not a number</p> <p>12 that's directly attributable to the death</p> <p>13 certificate data from Cobb County; is</p> <p>14 that fair to say?</p> <p>15 A. Well, it is in some sense</p> <p>16 because everything is based on the T</p> <p>17 codes. So it uses the T code information</p> <p>18 and then makes adjustments based on the</p> <p>19 peer reviewed literature.</p> <p>20 Q. Okay. And then you've</p> <p>21 adjusted that up because you believe that</p> <p>22 the certain nonprescription opioid deaths</p> <p>23 should be attributable to Rx or</p> <p>24 prescription opoids, right?</p>	<p style="text-align: right;">Page 101</p> <p>1 Okay. So, on Page 6 of your Cobb</p> <p>2 County report, there's some notes, a</p> <p>3 paragraph about your discussion with</p> <p>4 Christopher Gullledge at the bottom of the</p> <p>5 page.</p> <p>6 Do you see that?</p> <p>7 A. Yes.</p> <p>8 Q. Okay. And the second to the</p> <p>9 last sentence you wrote, "In 2020, the</p> <p>10 year with more acute accidental drug or</p> <p>11 alcohol deaths than seen in 2015 to 2019,</p> <p>12 fentanyl was determined to be present in</p> <p>13 49 percent of these deaths with</p> <p>14 prescription opoids present in</p> <p>15 25 percent."</p> <p>16 Did I read that correctly?</p> <p>17 A. Yes.</p> <p>18 Q. Did Dr. Gullledge have any</p> <p>19 further discussion with you about how</p> <p>20 he's seen fewer accidental drug deaths</p> <p>21 related to prescription opoids compared</p> <p>22 to fentanyl in recent years?</p> <p>23 MS. do AMARAL: Objection.</p> <p>24 A. I don't recall sitting here</p>

<p style="text-align: right;">Page 102</p> <p>1 today a discussion with Dr. Gullledge on 2 that specific topic. However, I've 3 analyzed the data on that topic so can 4 speak to it based on the data if you'd 5 like me to. 6 Q. Alright. I'm going to keep 7 moving here in the interest of time. 8 On Page 7, you begin a discussion 9 about Neonatal Abstinence Syndrome in 10 Cobb County. 11 A. Yes. 12 Q. And there's a Figure 9 that 13 includes a rate of Neonatal Abstinence 14 Syndrome; is that right? 15 A. Rate per 1,000 hospital 16 births, yes. 17 Q. Okay. And in the 18 spreadsheets that were provided to us, we 19 received a one-page spreadsheet that 20 we've marked as Exhibit 3B that, I guess, 21 relates to calculations for Figure 9; is 22 that right? 23 A. Yes. 24 Q. And if you look back at the</p>	<p style="text-align: right;">Page 104</p> <p>1 number of births with Neonatal Abstinence 2 Syndrome was also shown as 28; is that 3 right, in 2021? 4 A. In 2014, the estimated number 5 of NAS births is 28 and then in 2021, it 6 is, also, 28. 7 Q. Okay. And do you know how 8 much larger the population of Cobb County 9 was in 2021 compared to 2014? 10 A. Well, it's the number of live 11 births that matter for the calculation of 12 NAS, which I've listed in the column on 13 the left. 14 Q. And the rate that you're 15 referring to is that the column in 3B 16 that's listed "rate"? Is that the rate 17 of live births? 18 A. This is the number of live 19 births. 20 Oh, and then there's the rate. 21 There's the number of live births, the 22 NAS births and then the rate. 23 Q. Okay, right. 24 So, in 2014, is it -- your chart</p>
<p style="text-align: right;">Page 103</p> <p>1 figure itself, Figure 9, it shows that 2 the rate of Neonatal Abstinence Syndrome 3 in Georgia is well-below the national 4 rate, correct? 5 MS. do AMARAL: Objection, 6 vague. 7 A. It -- the rate in Georgia is 8 lower in -- than the national. But I 9 wouldn't say it's, "well-below." I think 10 it's just lower. 11 Q. Alright. And on Page 8 of 12 your report, in Table 1, you provided us 13 a number of estimated NAS births in Cobb 14 County. 15 Do you see that? 16 A. I do. 17 Q. Okay. And those estimates 18 were based on the calculations that are 19 shown here in Exhibit 3B; is that right? 20 A. Yes. 21 Q. Okay. And so, for example, 22 on Table 1 and also in 3B, the number of 23 estimated births with NAS in 2014 was 28 24 in Cobb County and then again the same</p>	<p style="text-align: right;">Page 105</p> <p>1 here in Exhibit 3B showing the rate of 2 live births was 2.866 in Cobb County? 3 A. 2.866 per a thousand live 4 births. 5 Q. Okay. And then in 2021 the 6 rate is up to 3.151 in Cobb County; is 7 that right? 8 A. Per a thousand live births, 9 right. 10 Q. So the rate of live birth is 11 higher in Cobb County in 2021? 12 A. No, there's a higher number 13 of live birth in 2014 than in 2021. 14 There is a higher number and so, if the 15 denominator is going down but the 16 numerator is staying the same, then the 17 rate goes up. 18 Q. Okay. So -- 19 A. There is a higher rate, 20 because there's fewer numbers of live 21 births. 22 Q. Okay. Fair enough. 23 And -- alright. I think we're done 24 with 3B?</p>

<p style="text-align: right;">Page 106</p> <p>1 MR. ESSIG: Is this a good 2 time for a break? 3 MS. do AMARAL: Sure. 4 MR. ESSIG: Okay. Let's 5 take a break. 6 THE VIDEOGRAPHER: We are 7 off the record. The time is 11:01. 8 (Recess taken 11:01 to 9 11:12 a.m.) 10 THE VIDEOGRAPHER: We are 11 now back on the record. The time 12 is 11:12 a.m. 13 Q. Okay. Page 10 of your 14 report, in the paragraph on "opioid 15 supply," you assert that, ARCOS data 16 recorded over 3 billions prescription 17 opioids supplied to Georgia from 2006 to 18 2014. Enough for 34 pills each year for 19 each resident. 20 Did I read that accurately? 21 A. You paraphrased it accurately. 22 Q. Yes, right. I'm sorry. If I 23 had read it, I would have said 24 "correctly," but I said "accurately."</p>	<p style="text-align: right;">Page 108</p> <p>1 calculations either here for Georgia or 2 for Cobb County? 3 A. No. Again, I just -- I used 4 a calculator. So I didn't preserve the 5 numbers. 6 Q. So you just calculated it on 7 hand and then typed it into the report 8 and there was no handwritten or 9 spreadsheet calculation provided? 10 A. Correct. 11 Q. So, and for Cobb County, you 12 note that for the same time frame, there 13 were enough for 27 pills per year for 14 every resident from 2006 to 2014; is that 15 right? 16 A. 34 pills, wasn't it? 17 Q. No, I'm sorry. 18 Georgia we just talked about, that 19 was 34. 20 A. Oh, I'm sorry. 21 Q. And the then last sentence 22 here you wrote -- 23 A. I see. 24 Q. -- In Cobb County, ARCOS data</p>
<p style="text-align: right;">Page 107</p> <p>1 Okay. But we agree those are the 2 numbers you provided there, correct? 3 A. Yes. 4 Q. How did you calculate those 5 totals for Georgia? 6 A. We used the publically 7 available ARCOS data management system 8 and calculated the total number of 9 prescription opioids by year from 2006 to 10 2014 and then divided that by the 11 population size. 12 Q. Okay. And were those 13 calculations done on a spreadsheet? 14 A. I think we just did them 15 using a calculator. 16 Q. Do you know if those 17 calculations were saved at all? 18 A. My calculator doesn't have a 19 save function. 20 Q. Okay. Because I don't think 21 that those calculations were produced to 22 us at all in the spreadsheets that we 23 received. 24 So did you preserve any of those</p>	<p style="text-align: right;">Page 109</p> <p>1 recorded 170,495,052 prescription opioid 2 pills supplied enough for 27 pills per 3 year for every resident. 4 Did I read that accurately? 5 A. Yes. 6 Q. Okay. So the Cobb County 7 average for pills per resident in your 8 calculations from 2006 to 2014 is, 9 actually, lower per resident than the 10 state calculation, correct? 11 A. Yes, the state is 34. The 12 Cobb County is 27. 13 Q. We are in agreement, okay. 14 Okay. Time for some more number 15 crunching. 16 On Page 11 of your report, you 17 discuss how you estimated the number of 18 individuals with opioid use disorder, 19 which you've abbreviated OUD, in Cobb 20 County, correct? 21 A. Yes. 22 Q. And the calculations behind 23 these estimates were provided to us in a 24 spreadsheet in the Excel file that was</p>

<p style="text-align: right;">Page 110</p> <p>1 labeled as Figure 11 and Table 2 and this</p> <p>2 is what is Exhibit 3C in front of you.</p> <p>3 Do you have that?</p> <p>4 A. Yes.</p> <p>5 Q. Okay. And, actually, I</p> <p>6 think, maybe this was a typo.</p> <p>7 But the figure for this data is,</p> <p>8 actually, on Page 14 and it's actually</p> <p>9 Figure 12; is that right?</p> <p>10 A. Oh, did we label the tab</p> <p>11 incorrectly?</p> <p>12 Q. It looks like the tab was</p> <p>13 labeled for Figure 11.</p> <p>14 But it's -- but would you agree</p> <p>15 that these calculations in Exhibit 3C are</p> <p>16 shown, at least, in part on Figure 12?</p> <p>17 A. Yes. I apologize.</p> <p>18 Q. Okay, no problem.</p> <p>19 Okay. So but looking at</p> <p>20 Exhibit 3C, the spreadsheet, what is your</p> <p>21 first assumption that you stated?</p> <p>22 A. Assumption 1 is the death</p> <p>23 rate among OUD cases is, approximately,</p> <p>24 equivalent to meta-analysis.</p>	<p style="text-align: right;">Page 112</p> <p>1 brief and work my way through it without</p> <p>2 repeating stuff.</p> <p>3 So, on the spreadsheet, you're</p> <p>4 using a mortality rate of what's shown as</p> <p>5 0.0052, which is what -- 0.52 death rate</p> <p>6 per hundred person years; is that right?</p> <p>7 A. Yes.</p> <p>8 Q. Okay. And the 2019 Larney</p> <p>9 meta-analysis reviewed a 124 studies for</p> <p>10 mortality rates of individuals using</p> <p>11 opioids extra medically; is that correct?</p> <p>12 A. Not exactly. So the title of</p> <p>13 the paper says, "Used Opioids Extra</p> <p>14 Medically," but I took an extra step of</p> <p>15 reviewing the underlying data that was</p> <p>16 used to produce the meta-analysis to</p> <p>17 ensure that the death rate that I was</p> <p>18 using was generalizable to people with</p> <p>19 opioid use disorder.</p> <p>20 Q. Okay. Is it fair to say then</p> <p>21 that none of the 124 studies including</p> <p>22 the Larney meta-analysis is focused on</p> <p>23 mortality rates of individuals using</p> <p>24 opioids as prescribed with medical</p>
<p style="text-align: right;">Page 111</p> <p>1 Q. Okay. And when you refer to</p> <p>2 the "meta-analysis," what are you</p> <p>3 referring to?</p> <p>4 A. That is the Larney paper that</p> <p>5 we discussed earlier.</p> <p>6 Q. Okay. And your report here</p> <p>7 beginning on Page 12, actually, discusses</p> <p>8 how you've used the Larney meta-analysis</p> <p>9 in your multiplier method; is that right?</p> <p>10 A. Beginning on Page 12, yes.</p> <p>11 Q. Yes.</p> <p>12 A. It begins on Page 11 but</p> <p>13 maybe -- okay, 11/12, in that area.</p> <p>14 Q. You're right. You're right.</p> <p>15 A little bit on 11 and then into 12.</p> <p>16 Okay. And you've done a similar</p> <p>17 multiplier method to calculate OUD rates</p> <p>18 in earlier cases in the litigation,</p> <p>19 correct?</p> <p>20 A. Yes.</p> <p>21 Q. This is the not the first</p> <p>22 time you've used Larney?</p> <p>23 A. No.</p> <p>24 Q. Okay. So I want to try to be</p>	<p style="text-align: right;">Page 113</p> <p>1 supervision?</p> <p>2 A. That's not fair to say.</p> <p>3 Q. Okay. How many of the 124</p> <p>4 Larney studies were -- strike that.</p> <p>5 How many of the 124 studies in the</p> <p>6 Larney meta-analysis were conducted</p> <p>7 within the United States?</p> <p>8 A. If you have the supplement to</p> <p>9 the Larney paper -- I assume you have it</p> <p>10 in your files. I can tell you exactly.</p> <p>11 There's -- I think, it's Supplementary</p> <p>12 Figure 720. That -- I would like to</p> <p>13 refer to that, to answer the question</p> <p>14 accurately.</p> <p>15 Q. Okay. Well, in the interest</p> <p>16 of time, I'll represent to you that --</p> <p>17 and you testified to this before -- that</p> <p>18 six of the studies in the Larney</p> <p>19 meta-analysis were conducted in the</p> <p>20 United States, okay?</p> <p>21 And you reference the United States</p> <p>22 studies in the middle of the second</p> <p>23 paragraph here on Page 12.</p> <p>24 Do you see that?</p>

<p style="text-align: right;">Page 114</p> <p>1 MS. do AMARAL: Counsel, do 2 you have that the Larney study so 3 she can take a look at it? 4 MR. ESSIG: I do. But I don't 5 think I'm going to have anymore 6 questions that will get into 7 that. But if we need to, we'll 8 get there. 9 MS. do AMARAL: Okay. 10 And which of her testimony 11 are you referring to past testimony? 12 MR. ESSIG: Certainly, the 13 Michigan Attorney General 14 litigation. 15 Q. Alright. Professor Keyes, 16 are you with me? 17 A. Uh-huh. 18 Q. So, on Page 12, you noted 19 that in the United States studies in 20 Larney, the range of overdose death rates 21 was comparable to the overall rate 22 ranging from 0.21 per 100 person years to 23 0.61 to a hundred person years. 24 Did I read that correctly?</p>	<p style="text-align: right;">Page 116</p> <p>1 combination of a range of studies. 2 Q. Okay. Did you pool the six 3 studies from the US to get an overdose 4 death rate for those six studies? 5 A. I did sensitivity analyses 6 and you can see in my peer reviewed 7 publication on this multiplier method to 8 review those sensitivity analyses in more 9 detail where we restricted to the US 10 numbers. However, pooling the six 11 studies would not be appropriate. 12 Q. Okay. So you're using here 13 the overall .52 per hundred years -- 14 person years overdose death rate from 15 Larney as a whole, correct? 16 A. Yes. 17 Q. Okay. Despite the fact that 18 the majority of the subjects in that 19 meta-analysis were not in the United 20 States? 21 A. That has no bearing on the 22 validity of the .52 estimate in Larney. 23 So, no, I -- 24 Q. Okay. And then --</p>
<p style="text-align: right;">Page 115</p> <p>1 A. Yes. 2 Q. Okay. Do you recall if 3 you've ever done your own statistical 4 analysis of the power of each of the six 5 United States articles either individually 6 or combined? 7 A. Can you say what you mean by 8 "power"? 9 Q. Well, in terms of -- let me 10 ask it a different way. 11 In terms of selecting either any 12 particular one of these studies or the 13 studies together for the death rate that 14 you're going to use in your calculations, 15 did you look at the statistical power of 16 any of the six studies? 17 MS. do AMARAL: Objection, 18 vague. 19 A. That would not be an 20 epidemiologically appropriate analysis to 21 do. 22 Q. Why not? 23 A. Because a meta-analysis 24 derives its appropriateness based on the</p>	<p style="text-align: right;">Page 117</p> <p>1 A. The appropriate analysis is 2 the .52 per hundred thousand. 3 Q. Okay. And then you go on to 4 discuss at the bottom of Page 12 that 5 your estimate involves applying a 6 correction to the estimate in Larney 7 because those studies were published, 8 quote, "before the outbreak of 9 fentanyl-induced death"; is that correct? 10 A. Correct. 11 Q. And so, in exhibit -- excuse 12 me -- 3C, what is your second assumption? 13 A. The death rate when fentanyl 14 -- the death rate when fentanyl exposed 15 is, approximately, three times the 16 non-fentanyl death rate based on existing 17 literature. 18 Q. And what is the literature 19 that you used to decide that the death 20 rate should be three times higher? 21 A. I used data from the Centers 22 for Disease Control, as well as literature 23 from the National Vital Statistics 24 System.</p>

<p style="text-align: right;">Page 118</p> <p>1 Q. So I want to look at your 2 calculations on Page 13. And the first 3 full paragraph you write, "In Cobb County 4 the number of fatal overdoses in 2021, 5 the most recent year of available data, 6 is 174 and an estimated 59 percent of 7 those deaths are attributable to 8 synthetic opioids." 9 Did I read that correctly? 10 A. Yes. 11 Q. And that 59 percent would 12 include fentanyl-related deaths, correct? 13 A. 59 percent would include but 14 are not limited to fentanyl-associated 15 deaths. 16 Q. And, as we saw back in 17 Exhibit 3A, the Medical Examiner in 2021 18 in Cobb County found that the majority of 19 these deaths were not attributable to 20 prescription opioids, correct? 21 MS. do AMARAL: Objection, 22 vague. 23 A. I have not -- that's based on 24 the deposition testimony?</p>	<p style="text-align: right;">Page 120</p> <p>1 opioids that are attributable to 2 prescription opioids. 3 Q. So your calculation is 4 different from my question. 5 My question is the 56 in Box L is 6 the Medical Examiner's determination that 7 the deaths were due directly to 8 prescription opioids, correct? 9 A. No. Those are -- the 56 10 deaths are those that are coded with a T 11 code, as described in Columns D through 12 G. 13 Q. But by the Medical Examiner? 14 A. The Medical Examiner makes a 15 determination of the substances that 16 contributed to the death. 17 Q. Right. And that's what is 18 shown in Box L/Line 71, correct? 19 MS. do AMARAL: Objection, 20 calls for speculation. 21 A. Box L counts several T codes 22 that are provided in the spreadsheet. 23 Q. Okay. 24 Alright. I want to go back to 3C</p>
<p style="text-align: right;">Page 119</p> <p>1 Q. And based on 3A. 2 A. Sorry. I guess I'm not 3 understanding the question. 4 As we saw -- I'm sorry. I don't 5 mean to repeat the question. 6 In 2021, in Cobb County, the 7 Medical Examiner found -- and you're 8 basing that on his deposition, right. 9 Q. No. And, also, the numbers 10 provided in Exhibit 3A for 2021. 11 A. Oh, okay. 12 So for 2021, in Cobb, there were 13 129 total opioid deaths. 14 And I'm sorry. If you would just 15 remind me what cell you're looking at for 16 the majority of these deaths are not 17 attributable to prescription opioids? 18 Q. Sure. So, in Cell L/Line 719, 19 the deaths due directly to prescription 20 opioids are 56, correct? 21 A. That's -- so you would need 22 to sum Columns L and Column N. So 23 there's 56 directly attributable. 24 Thirty-nine deaths due to nonprescription</p>	<p style="text-align: right;">Page 121</p> <p>1 and your report here on Page 13. 2 So your sentence on Page 13 is 3 that, "I estimate that there are, 4 approximately, 15,349 individuals who 5 have OUD in Cobb County." 6 Did I read that accurately? 7 A. Yes. 8 Q. Okay. And so, if we look at 9 Exhibit 3C -- and you changed it up on us 10 here. So the horizontal is now the 11 years. 12 And so box -- or Column Y, do you 13 see that? 14 A. Column Y, I see that. 15 Q. That's data for 2021, correct? 16 A. That's correct. 17 Q. Okay. And so, if we go down 18 to Line 29 for Cobb County and that 19 appears to be a row for OUD population; 20 is that right? 21 A. Yes. 22 Q. Okay. And so, if we go to 23 Line 29/Column Y, what does that box say? 24 A. Line 29/Column Y says 15,349.</p>

<p style="text-align: right;">Page 122</p> <p>1 Q. Okay. And that's the same</p> <p>2 number you have in your report, correct?</p> <p>3 A. Correct.</p> <p>4 Q. Okay. So take us through</p> <p>5 your calculation here that gets you to</p> <p>6 this figure in Line 29/Column Y.</p> <p>7 A. Okay. So the first number</p> <p>8 that is important is in Row 10/Column Y.</p> <p>9 That is the total number of drug overdose</p> <p>10 deaths in Cobb, based on the CDC WONDER</p> <p>11 Data.</p> <p>12 That number, the first -- to</p> <p>13 describe it in words, the first thing we</p> <p>14 do is divide that by the overdose rate in</p> <p>15 the OUD population from Larney, which is</p> <p>16 .0052.</p> <p>17 However, we make some corrections</p> <p>18 to that number, because we know that the</p> <p>19 death rate among the OUD population is</p> <p>20 higher in a fentanyl-exposed population</p> <p>21 than in a non-fentanyl-exposed population.</p> <p>22 Well, there's two numbers that you</p> <p>23 need to make that correction. One is</p> <p>24 what portion of the OUD population is</p>	<p style="text-align: right;">Page 124</p> <p>1 it's weighted by the proportion of the</p> <p>2 population that's fentanyl exposed.</p> <p>3 And so, if you can just imagine</p> <p>4 that you take 00.52 times 0.41 plus</p> <p>5 0.0156 times 0.0 -- 0.59, that's the</p> <p>6 denominator. You divide the total number</p> <p>7 of drug overdoses by that and you get</p> <p>8 15,349.</p> <p>9 Q. Okay. And after you did</p> <p>10 that, you applied the Larney Confidence</p> <p>11 Interval to that number, right?</p> <p>12 You talk about that in your</p> <p>13 discussion on Page 13?</p> <p>14 A. Yes.</p> <p>15 Q. And so, by doing that, you</p> <p>16 wrote that a plausible range number of</p> <p>17 individuals that have OUD as 13,528 to</p> <p>18 17,351.</p> <p>19 Did I read that correctly?</p> <p>20 A. Yes.</p> <p>21 Q. And that calculation with the</p> <p>22 confidence interval on Page 13, is that</p> <p>23 reflected anywhere here on Exhibit 3C?</p> <p>24 Because I didn't see it.</p>
<p style="text-align: right;">Page 123</p> <p>1 fentanyl exposed.</p> <p>2 And the second number you need is</p> <p>3 how much higher is their death rate</p> <p>4 compared to .0052. So we estimate those</p> <p>5 two numbers using additional data.</p> <p>6 First, we estimate the proportion</p> <p>7 of the OUD population that is fentanyl</p> <p>8 exposed by calculating the proportion of</p> <p>9 total deaths in that year are for which</p> <p>10 there was a T40.4 code.</p> <p>11 And that you will find in column --</p> <p>12 or in Row 17, Column Y/Row 17.</p> <p>13 In Cobb, we find that 59 percent of</p> <p>14 the deaths involved T40.4.</p> <p>15 So we estimate 59 percent of the</p> <p>16 population exposed to fentanyl.</p> <p>17 Then we need, okay, how much higher</p> <p>18 is the death rate in the fentanyl-exposed</p> <p>19 population than in the not</p> <p>20 fentanyl-exposed population. And that's</p> <p>21 where we bring in that 0.0156.</p> <p>22 So then the denominator of the</p> <p>23 total prevalence estimate is a weighted</p> <p>24 combination of 0.0052 and 0.0156. And</p>	<p style="text-align: right;">Page 125</p> <p>1 A. No, we just did that with a</p> <p>2 calculator.</p> <p>3 Q. Okay. Did you just calculate</p> <p>4 it and write it directly into the report?</p> <p>5 A. Yeah.</p> <p>6 Q. You didn't write it out or</p> <p>7 keep any of the papers for that</p> <p>8 calculation?</p> <p>9 A. No.</p> <p>10 Q. Okay. Alright.</p> <p>11 Okay. And so your next sentence --</p> <p>12 can you read it for us?</p> <p>13 A. "There is an estimated</p> <p>14 762,944 people in Cobb County. Thus this</p> <p>15 estimate indicates that the prevalence of</p> <p>16 OUD in Cobb County is, approximately,</p> <p>17 2.02 percent."</p> <p>18 Q. Okay. And so is this simple</p> <p>19 math of the 15,349 into this 777,062,944?</p> <p>20 A. Yes.</p> <p>21 Q. Okay.</p> <p>22 A. Performed with a calculator.</p> <p>23 Q. Okay.</p> <p>24 A. Actually, that is on the</p>

<p style="text-align: right;">Page 126</p> <p>1 spreadsheet. It's Line 24 -- oh, no, 2 Line 32 on the spreadsheet. 3 Q. Got it. Thank you. 4 Okay, great. I think that's it for 5 3C. 6 In the next section of your report 7 that begins on Page 13 here is 8 calculations about the number of 9 individuals with opioid use disorder 10 across time. 11 And you do that for the US Georgia 12 and Cobb County, correct? 13 A. Yes. 14 Q. And in the second sentence 15 you state, "By way of summary, I use the 16 death rate among individuals of OUD from 17 the most recent meta-analysis of cohort 18 studies in order to anchor my estimation 19 to the best available literature." 20 Did I read that correctly? 21 A. Yes. 22 Q. Okay. And, again, when you 23 are referring to the "meta-analysis," 24 you're using the Larney analysis again?</p>	<p style="text-align: right;">Page 128</p> <p>1 each year? 2 A. So that's what I was talking 3 about before. You take the denominator 4 of the total calculation. It's the 5 0.0052 times the proportion of deaths for 6 which synthetic opioids were not 7 involved. 8 So, in 2021, that was 41 plus 9 0.0156 times the proportion of deaths for 10 which synthetic opioids were involved. 11 So that's the "weight." 12 So, if you can -- I think another 13 simple way to think about is, like, 14 before, you know, the -- before the 15 increase in fentanyl in the US 16 population, most of the deaths are not 17 T40.4 coded. 18 So the weight is going to be close 19 to one for 0.0052 and close to 0 for 20 0.0156. As the proportion of overdose 21 deaths that have a T40.4 code increases, 22 those weights are then going to shift. 23 And so, for Cobb County by 2021, 24 59 percent of the population is excessed</p>
<p style="text-align: right;">Page 127</p> <p>1 A. Yes. 2 Q. Okay. And then in a couple 3 sentences down you wrote, "Specifically, 4 for each year, I estimated that proportion 5 of overdose deaths in which synthetic 6 opioids were listed as a contributing 7 cause. I then weighed each year for the 8 higher death rate from synthetic opioids 9 that would be expected." 10 Did I read that correctly? 11 A. Yes. 12 Q. Alright. What data did you 13 rely upon to make your estimate of the 14 proportion of overdose deaths in which 15 "synthetic opioids were listed as a 16 contributing cause"? 17 A. The National Vital Statistics 18 System. 19 Q. Okay. And then how did you 20 weight -- it says "weigh." 21 Should that be weigh each year or 22 weight each year? 23 A. "Weighted." 24 Q. Okay. How did you weight</p>	<p style="text-align: right;">Page 129</p> <p>1 to the higher death rate and 41 percent 2 of the population is exposed to the lower 3 death rate. And that's how the weight 4 works in theory, you know, in words. 5 Q. Okay. 6 Alright. So you used this method 7 of estimation to calculate the estimated 8 number of individuals with opioid use 9 disorder in the US, Georgia and Cobb 10 County across time, right? 11 A. Yes. 12 Q. Okay. And Figure 14, which 13 is on Page 15 but starting on the bottom 14 of Page 14 you wrote that, "Figure 14 15 below provides the distribution of my 16 estimate of OUD cases in Cobb County 17 stratified by those that I estimate are 18 directly attributable to prescription 19 opioids (opioid use disorder due to 20 prescription opioids), and indirectly 21 attributable to prescription opioids." 22 I'm going to stop there, because it goes 23 on a little bit. 24 But this is calculations that were</p>

<p style="text-align: right;">Page 130</p> <p>1 done for this on Exhibit 3D; is that 2 right? 3 A. That's right. 4 Q. Okay. And, actually, again, 5 the tab for this Excel file that was 6 produced to us was labeled as Figure 13, 7 but these calculations are actually for 8 Figure 14, right? 9 A. Yes. I apologize. 10 Q. Okay. 11 Okay. And so, if we look at Cobb 12 County here, which starts on Line 6 and 13 intersects first with Column K for 2015 -- 14 do you see that? 15 A. Yes. 16 Q. That's where the first year 17 where you get actual numbers, correct? 18 A. Yes. Well, there's numbers 19 in prior years, but that's the first year 20 where we estimate the numbers that are in 21 Figure 14. 22 Q. Okay. And why did you not 23 start doing these calculations until 2015 24 for Cobb?</p>	<p style="text-align: right;">Page 132</p> <p>1 did it have publically available county 2 data for you to use? 3 A. No, we used the rates from 4 Georgia, based on the -- the RDAS, which 5 is the -- I'm not remembering right now 6 what "RDAS" stands for. But it's 7 analytic software that anyone can use. 8 It's publically available to analyze 9 state specific data. The county specific 10 data for NSDUH is more restrictive. 11 Q. Okay. So clarify for us. 12 For example, in Rows 6 and 7 about Cobb 13 County HUD cases, Cobb HUD cases -- do 14 you see that? 15 A. Yes, I see that. 16 Q. Is that database data or is 17 that estimated data from Georgia 18 information? 19 A. That is estimated data from 20 Georgia information. 21 Q. Okay. And you believe and 22 you've testified about this before that 23 the NSDUH data you think that undercounts 24 OUD, correct?</p>
<p style="text-align: right;">Page 131</p> <p>1 A. Because the data that we 2 relied on for our estimation of direct 3 and indirect attribution were suppressed 4 for previous years, that "NA." 5 Q. And is that -- "suppressed" 6 in which database? 7 A. He used the National Survey 8 of Drug Use and Health. 9 Q. And do you, also, understand 10 from Christopher Gullledge's testimony 11 that Cobb County didn't have this kind of 12 data on attribution for types of opioids 13 found in a death case prior to 2015? 14 A. This does not use death 15 cases. This is not -- these data do not 16 rely on death at all. 17 Q. Okay. So it's not related to 18 Gullledge's data? 19 A. Correct. 20 Q. Okay. So it was just not 21 available to you, other than in an "NA" 22 form? 23 A. Right. 24 Q. Alright. And the NSDUH data,</p>	<p style="text-align: right;">Page 133</p> <p>1 A. Yes, the NSDUH data 2 undercounts OUD, which is why we only 3 used ratios, not the actual underlying 4 OUD estimates from the NSDUH data for 5 exactly that reason. 6 Q. Okay. So, in Page 15 your 7 discussion here, is that you used a 8 multiplier of 4.49 derived from what you 9 describe as overlapping 2015 data from 10 Massachusetts state level NSDUH data and 11 from a capture/recapture study in 12 Massachusetts by Baracos of OUD 13 prevalence, correct? 14 A. No, those are two different 15 sections of the -- two different -- they 16 don't overlap at all, those calculations. 17 Q. Okay. 18 A. So the Baracos study, that 19 4 percent, was used as a sensitivity 20 analysis on the multiplier method for the 21 OUD prevalence estimation. 22 But what is on Figure 14 did not 23 use that 4 percent multiplier. Rather we 24 used the ratio based on the Georgia RDAS</p>

<p style="text-align: right;">Page 134</p> <p>1 data of the total OUD cases for which 2 there was prescription opioids use 3 listed. So we don't use Baracos for 4 Figure 14 at all. 5 Q. Okay, fair enough. 6 And when you -- alright. 7 So, when you look at Figure 14 -- 8 and that's at the top of Page 17. 9 Do you have that in front of you? 10 A. Yes. 11 Q. Okay. So is it fair to say 12 -- strike that. 13 When you look at Figure 14, the OUD 14 prevalence has decreased since 2017 in 15 Cobb County, correct? 16 A. The number of cases in 2018 17 -- the point estimate for the number of 18 cases in 2018 is lower than the point 19 estimate for the number of cases in 2017. 20 That's how I would read that. 21 Q. Okay. And it's hard to see. 22 But isn't it fair to say that the number 23 of cases in 2019 is, also, lower than the 24 data in 2018?</p>	<p style="text-align: right;">Page 136</p> <p>1 of individuals in Cobb County are between 2 18 and 64. And, for purposes of this 3 calculation, you assumed that each of 4 those individuals is the parent of, at 5 least, one child; is that right? 6 A. What I state in the report is 7 that it's a reasonable range for 8 individuals parenting dependence. 9 Q. Did you make any effort to 10 look for any census data or otherwise 11 that indicates how many people in Cobb 12 County between the ages of 18 and 64 are 13 actually the parents of, at least, one 14 child? 15 A. I relied on the census data 16 that I included in this report only. 17 Q. Based on your assumption that 18 64 percent of individuals in Cobb County 19 are parents and you multiplied that by 20 the 15,349 individuals that you estimated 21 with OUD in Cobb County, you calculated 22 that -- you cite on Page 17 that, 23 approximately, 9,823 children in Cobb 24 County are potentially exposed to</p>
<p style="text-align: right;">Page 135</p> <p>1 A. Yeah. And this -- you can 2 look at Table 2, to get those exact 3 numbers. 4 But, yes, there's about 400 fewer. 5 The point estimate is about 400 fewer for 6 2019 than for 2018. 7 Q. Okay. I think I'm done with 8 3B. 9 Okay. I'm trying to -- moving fast 10 here. 11 Page 17 of your Cobb report, you 12 attempt to estimate the burden of harm 13 for families and children in Cobb County 14 from OUD, correct? 15 A. Yes. 16 Q. And you started with your 17 calculation that you had made previously 18 of individuals with OUD in Cobb County in 19 2021 of 15,349 and you attempt here to 20 estimate how many of those individuals 21 may be parents, correct? 22 A. Yes. 23 Q. And your discussion says that 24 you looked at census data that 64 percent</p>	<p style="text-align: right;">Page 137</p> <p>1 parental opioid use during development; 2 is that correct? 3 A. Yes. 4 Q. Alright. And then, also, in 5 this section of your report, you offer 6 some opinions about how many of those 7 estimated 9823 children may have various 8 psychiatric and mental health disorders 9 as a result of parental opioid use. 10 A. Yes. 11 Q. Okay. And you cited to two 12 articles that references 90 and 91 that 13 provide nationwide prevalence rates for 14 mental disorders and learning 15 disabilities in support of your opinion 16 here that, quote, "children who 17 experienced parental substance abuse have 18 rates of disorder that are 2 to 3 times 19 higher than other children," unquote; is 20 that right? 21 A. Yes. 22 Q. Alright. When was the last 23 time that you reviewed these two 24 articles, the 2010 Mara Kangas article</p>

<p style="text-align: right;">Page 138</p> <p>1 and the 2007 Alterac (phonetic) article?</p> <p>2 A. Probably within the last six</p> <p>3 months to a year.</p> <p>4 Q. Okay. Do you recall anywhere</p> <p>5 in either of those two articles that they</p> <p>6 express or say that children who</p> <p>7 experience parental substance use have</p> <p>8 rates of disorder that are two to three</p> <p>9 times higher than other children?</p> <p>10 A. I would need to look at the</p> <p>11 article again.</p> <p>12 Q. Okay. Do you have any other</p> <p>13 sources for this estimate of children who</p> <p>14 experience parental substance abuse being</p> <p>15 -- having rates of disorder that are 2 or</p> <p>16 3 times higher than other children?</p> <p>17 A. That is the source that I</p> <p>18 used in this paragraph. There's other</p> <p>19 literature that would corroborate that as</p> <p>20 well.</p> <p>21 Q. Did you do any research with</p> <p>22 -- related to these disorders and</p> <p>23 learning disabilities for any data</p> <p>24 specific to Cobb County either contained</p>	<p style="text-align: right;">Page 140</p> <p>1 A directly attributable death to</p> <p>2 opioid use would be determined by the</p> <p>3 Medical Examiner's office, correct?</p> <p>4 MS. do AMARAL: Objection,</p> <p>5 calls for speculation, vague.</p> <p>6 A. I used the T codes that were</p> <p>7 on the death certificates for direct</p> <p>8 attribution.</p> <p>9 Q. Right. And those codes would</p> <p>10 be provided by a Medical Examiner office,</p> <p>11 correct?</p> <p>12 MS. do AMARAL: Same</p> <p>13 objection.</p> <p>14 Q. At least, in Cobb County.</p> <p>15 A. The Medical Examiner provides</p> <p>16 the underlying contributing causes of</p> <p>17 death.</p> <p>18 Q. And so directly attributable</p> <p>19 to prescription opioid use would be a</p> <p>20 death where prescription opioid use is</p> <p>21 listed or coded as a cause of death?</p> <p>22 A. That's right.</p> <p>23 Q. And do you know if that</p> <p>24 includes deaths where prescription opioid</p>
<p style="text-align: right;">Page 139</p> <p>1 in reports or other data from the Cobb</p> <p>2 County Department of Health, for example?</p> <p>3 A. Similar to other topics that</p> <p>4 we've talked about, I relied on data that</p> <p>5 included Georgia and Cobb County in those</p> <p>6 -- in their estimates.</p> <p>7 Q. I was asking any -- did you</p> <p>8 review anything that is data that is,</p> <p>9 specifically, generated as to Cobb</p> <p>10 County, not --</p> <p>11 A. Those data -- right.</p> <p>12 But the data from Cobb County was,</p> <p>13 specifically, generated from Cobb County</p> <p>14 for those studies.</p> <p>15 Q. Alright. Beginning on</p> <p>16 Page 19, you try to calculate for us how</p> <p>17 many heroin and opioid deaths in Cobb</p> <p>18 County are directly and indirectly</p> <p>19 attributable to prescription opioid use.</p> <p>20 Do you see that?</p> <p>21 A. Yes.</p> <p>22 Q. And I think we talked about</p> <p>23 this before, but just so we're on the</p> <p>24 same page...</p>	<p style="text-align: right;">Page 141</p> <p>1 use is listed as a significant condition</p> <p>2 contributing to the death but not a cause</p> <p>3 of death?</p> <p>4 MS. do AMARAL: Objection,</p> <p>5 vague, calls for speculation.</p> <p>6 A. I believe we just used the T</p> <p>7 codes that were contributing causes of</p> <p>8 death.</p> <p>9 Q. What is your definition for a</p> <p>10 death indirectly attributable to</p> <p>11 prescription opioids, in the context of a</p> <p>12 Medical Examiner report?</p> <p>13 A. So, in the context of this</p> <p>14 report, which is what I can speak to,</p> <p>15 indirectly attributable were deaths where</p> <p>16 prescription opioids were not listed as a</p> <p>17 contributing cause of death but the death</p> <p>18 remains attributable based on the</p> <p>19 estimate of the transition to heroin and</p> <p>20 illicit opioid use that started with</p> <p>21 prescription opioids.</p> <p>22 Q. So that's an estimate based</p> <p>23 on what?</p> <p>24 A. That is the estimate that's</p>

<p style="text-align: right;">Page 142</p> <p>1 based on the method -- the peer reviewed</p> <p>2 method by Cerda.</p> <p>3 Q. Okay. In the third paragraph</p> <p>4 on this page that begins with "first," in</p> <p>5 this discussion you state you're using,</p> <p>6 quote, "the most conservative approach"</p> <p>7 to determine the lower bound of proportion</p> <p>8 of OUD and opioid death indirectly</p> <p>9 attributable to prescription opioids."</p> <p>10 Why do you believe you were using</p> <p>11 "the most conservative approach"?</p> <p>12 A. Because the NSDUH data</p> <p>13 underestimates OUD.</p> <p>14 Q. In your discussion on Page 20,</p> <p>15 you stated that you average the rates</p> <p>16 between 2006 and 2014 to calculate the,</p> <p>17 quote, "a minimum of 53.4 percent of</p> <p>18 opioid use disorders cases and deaths in</p> <p>19 Cobb County are indirectly attributable</p> <p>20 to prescription opioids in those years."</p> <p>21 Did I read that correctly?</p> <p>22 A. Yes.</p> <p>23 Q. But at the end of this</p> <p>24 paragraph, you opine that the, quote,</p>	<p style="text-align: right;">Page 144</p> <p>1 A. Right.</p> <p>2 Q. Because many of those deaths</p> <p>3 are fentanyl-related deaths, correct?</p> <p>4 A. Well, some fentanyl deaths</p> <p>5 are prescription opioid overdose deaths.</p> <p>6 The delta between the summation of the</p> <p>7 orange and blue lines would be deaths for</p> <p>8 which there's no estimated history of any</p> <p>9 prescription opioid use. Many of the</p> <p>10 illicit fentanyl deaths would still be</p> <p>11 attributable to prescription opioids, if</p> <p>12 those individuals started their opioid</p> <p>13 using trajectory with a prescription</p> <p>14 opioid. So the deaths that are not</p> <p>15 included are those with no history of any</p> <p>16 prescription opioid use.</p> <p>17 Q. Okay. So, on pages --</p> <p>18 starting with the bottom of Page 20,</p> <p>19 you've got a new section in your Track 8</p> <p>20 report here compared to Track 7 about the</p> <p>21 "emergence of fentanyl as a cause of</p> <p>22 opioid overdose death in the United</p> <p>23 States."</p> <p>24 Why did you decide to add this in</p>
<p style="text-align: right;">Page 143</p> <p>1 "true proportion," unquote, would be</p> <p>2 closer to three-quarters.</p> <p>3 A. Yes.</p> <p>4 Q. What is the basis for that</p> <p>5 opinion?</p> <p>6 A. That is based on the section</p> <p>7 of the general report on trends that the</p> <p>8 increase risk of heroin and other opioid</p> <p>9 use based on starting with prescription</p> <p>10 opioids.</p> <p>11 Q. So, in Figure 15 here, you're</p> <p>12 attempting to include what you described</p> <p>13 as all of the deaths attributable to</p> <p>14 opioids overall directly attributable to</p> <p>15 prescription opioids and indirectly</p> <p>16 attributable to prescription opioids as</p> <p>17 well?</p> <p>18 A. Correct.</p> <p>19 Q. And, if you look in 2021, the</p> <p>20 deaths that you've got as both directly</p> <p>21 and indirectly attributable to</p> <p>22 prescription opioids, those don't equal</p> <p>23 all of the overdose deaths shown in the</p> <p>24 black line in 2021?</p>	<p style="text-align: right;">Page 145</p> <p>1 your Track 8 report?</p> <p>2 A. Based on the accumulating</p> <p>3 epidemiological literature that fentanyl</p> <p>4 and other synthetic opioids were</p> <p>5 contributing to the increases in overdose</p> <p>6 death.</p> <p>7 Q. Okay. Is it fair to say that</p> <p>8 while you do provide data in Figure 16 on</p> <p>9 opioid overdose deaths in Georgia from</p> <p>10 1999 through 2021 that's from the CDC</p> <p>11 WONDER database, you don't have a</p> <p>12 separate line breaking out any Cobb</p> <p>13 County specific data in this figure?</p> <p>14 A. That's right. Figure 16 is</p> <p>15 just based on Georgia data.</p> <p>16 Q. One of your opinions in this</p> <p>17 section is that, quote, "The available</p> <p>18 evidence indicates that almost all people</p> <p>19 who use fentanyl are those with a history</p> <p>20 of heroin or prescription opioid use."</p> <p>21 Is that your opinion today?</p> <p>22 A. I'm sorry. Can you point me</p> <p>23 to where that is in the report? I just</p> <p>24 want to see the context.</p>

<p style="text-align: right;">Page 146</p> <p>1 Q. Sure.</p> <p>2 Of course, that's the one line I</p> <p>3 didn't highlight.</p> <p>4 A. I'm looking for it, too.</p> <p>5 Q. Here we go.</p> <p>6 A. Oh, I found it.</p> <p>7 Q. On Page 22, in the top</p> <p>8 paragraph about halfway down, "Thus</p> <p>9 available evidence indicates that almost</p> <p>10 all people who use fentanyl are those</p> <p>11 with a history of heroin or prescription</p> <p>12 opioid use."</p> <p>13 Did I read that correctly?</p> <p>14 A. Yes.</p> <p>15 Q. Is that your opinion today?</p> <p>16 A. Based on the data that I have</p> <p>17 reviewed, yes.</p> <p>18 Q. Would you agree that more</p> <p>19 recent medical literature is reporting</p> <p>20 that more and more fentanyl users have an</p> <p>21 initiated their opioid use with fentanyl?</p> <p>22 A. I would need to see the data</p> <p>23 to confirm that.</p> <p>24 Q. Okay. The final section of</p>	<p style="text-align: right;">Page 148</p> <p>1 Q. And, again, Figure 17 you're</p> <p>2 providing data with regard to the number</p> <p>3 of cocaine or psycho-stimulant overdose</p> <p>4 deaths involving opioids in Georgia by</p> <p>5 opioid category based on data sourced</p> <p>6 from the CDC WONDER database, correct?</p> <p>7 A. That's right.</p> <p>8 Q. And Figure 17 does not break</p> <p>9 out or depict any Cobb County specific</p> <p>10 data in a line or otherwise, correct?</p> <p>11 A. That's correct. This is for</p> <p>12 Georgia overall.</p> <p>13 Q. Alright. I'm going to do a</p> <p>14 little stuff and then we'll take a lunch</p> <p>15 break and we're going to turn it over to</p> <p>16 Mr. Pack and then I might have some</p> <p>17 questions after that but...</p> <p>18 Is it correct to say you're not</p> <p>19 going to be offering any opinions at the</p> <p>20 trial of this case related to Publix's</p> <p>21 market share and dispensing prescription</p> <p>22 opioids in Cobb County compared to all</p> <p>23 other the other pharmacies and grocery</p> <p>24 stores with pharmacies in Cobb County?</p>
<p style="text-align: right;">Page 147</p> <p>1 your Cobb County report here in Schedule</p> <p>2 A begins at the bottom of Page 22. It</p> <p>3 discusses stimulant death trends in the</p> <p>4 United States and the contribution of</p> <p>5 opioids.</p> <p>6 This is also a new section here in</p> <p>7 your Track 8 report?</p> <p>8 A. Yes.</p> <p>9 Q. Why did you add this section?</p> <p>10 A. Again, based on the</p> <p>11 accumulating literature that's stimulant</p> <p>12 deaths are also increasing in the United</p> <p>13 States.</p> <p>14 Q. Did anyone ask you to add</p> <p>15 these sections to your report?</p> <p>16 A. I felt that it was an</p> <p>17 important update to the literature.</p> <p>18 There is a lot of discussion in the peer</p> <p>19 reviewed literature. So I felt that it</p> <p>20 was important to include the updated data</p> <p>21 specific to stimulants. And it had come</p> <p>22 up quite a bit, the extent to which</p> <p>23 increases in overdose deaths were</p> <p>24 stimulant related.</p>	<p style="text-align: right;">Page 149</p> <p>1 A. I have not looked at Publix'</p> <p>2 market share. So my opinions on Publix</p> <p>3 relate to the overall contribution to the</p> <p>4 opioid epidemic. But I have not analyzed</p> <p>5 data with respect to its market share</p> <p>6 compared to other pharmacies and grocery</p> <p>7 stores.</p> <p>8 MR. ESSIG: Okay. I think</p> <p>9 this is a good time for a lunch</p> <p>10 break.</p> <p>11 THE VIDEOGRAPHER: We are off</p> <p>12 the record. The time is 12:00 p.m.</p> <p>13 (Lunch recess taken 12:00 to</p> <p>14 12:41 p.m.)</p> <p>15 THE VIDEOGRAPHER: We are back</p> <p>16 on the record. The time is</p> <p>17 p.m.</p> <p>18 Q. Professor Keyes, I hope you</p> <p>19 had a nice lunch.</p> <p>20 A. Yes.</p> <p>21 Q. And we're back on the record</p> <p>22 and you're still under oath.</p> <p>23 I just have a couple more for now</p> <p>24 and then I'll turn it over to Mr. Pack.</p>

<p style="text-align: right;">Page 150</p> <p>1 You've offered a few opinions in</p> <p>2 your report about oversupply of opioids.</p> <p>3 A. Yes.</p> <p>4 Q. Okay. And just a couple of</p> <p>5 specific questions.</p> <p>6 Have you calculated the amount of</p> <p>7 opioids in Cobb County that you believed</p> <p>8 were oversupplied between 1999 and 2021?</p> <p>9 A. I have reviewed the</p> <p>10 epidemiological literature, which provides</p> <p>11 quantitative estimates of oversupply and</p> <p>12 I have confirmed that those data include</p> <p>13 national and Cobb specific data. So that</p> <p>14 I believe that those results generalize</p> <p>15 to Cobb County.</p> <p>16 Q. Okay. But, in terms of</p> <p>17 crunching numbers on a spreadsheet like</p> <p>18 you did for some of your other</p> <p>19 calculations and estimations in this</p> <p>20 case, have you done that with regard to</p> <p>21 the amount of opioids in Cobb County</p> <p>22 between 1999 and 2021 that you believe</p> <p>23 were oversupplied?</p> <p>24 (Stenographer clarification.)</p>	<p style="text-align: right;">Page 152</p> <p>1 Cobb County from 1999 to 2021 that you</p> <p>2 would estimate would have resulted in a</p> <p>3 lower rate of OUD and opioid overdose</p> <p>4 death?</p> <p>5 MS. do AMARAL: Objection,</p> <p>6 vague.</p> <p>7 A. Similarly, I have reviewed the</p> <p>8 epidemiological and medical literature on</p> <p>9 that topic and ensured that it included</p> <p>10 data from the relevant jurisdiction.</p> <p>11 Those studies included many spreadsheets</p> <p>12 and I reviewed that literature and my</p> <p>13 opinions are based on the peer reviewed</p> <p>14 literature that's available.</p> <p>15 Q. Okay. And then, similarly,</p> <p>16 same similar question.</p> <p>17 Have you then performed any</p> <p>18 spreadsheet calculations that you could</p> <p>19 have provided to us today with regard to</p> <p>20 the level of opioid supply in Cobb County</p> <p>21 that you would estimate or opine would</p> <p>22 result in lower rates of OUD and opioid</p> <p>23 overdose deaths?</p> <p>24 MS. do AMARAL: Objection,</p>
<p style="text-align: right;">Page 151</p> <p>1 MR. ESSIG: Oversupplied.</p> <p>2 MS. do AMARAL: Objection,</p> <p>3 vague.</p> <p>4 Go ahead.</p> <p>5 A. The analysis that I've done</p> <p>6 is to review the existing literature and</p> <p>7 provide quantitative bounds based on the</p> <p>8 literature that is available, which does</p> <p>9 involve crunching numbers and other</p> <p>10 calculations that are detailed in the</p> <p>11 generic section of my report.</p> <p>12 Q. But you haven't provided to</p> <p>13 us in a spreadsheet or otherwise any</p> <p>14 specific calculations that you made with</p> <p>15 regard to opioid oversupply in Cobb</p> <p>16 County, fair to say?</p> <p>17 A. I don't have numbers on a</p> <p>18 spreadsheet that have been produced for</p> <p>19 that calculation.</p> <p>20 Q. Okay. And one more similar</p> <p>21 question.</p> <p>22 Have you performed any spreadsheet</p> <p>23 calculations with regard to attempting to</p> <p>24 calculate a level of opioid supply in</p>	<p style="text-align: right;">Page 153</p> <p>1 vague.</p> <p>2 A. My opinions with respect to</p> <p>3 the level of opioid supply in Cobb County</p> <p>4 that would result in lower OUD and</p> <p>5 overdose deaths are contained in the</p> <p>6 report.</p> <p>7 I have not produced my own</p> <p>8 spreadsheet to the -- with this report,</p> <p>9 rather I have relied on the existing</p> <p>10 medical literature to provide that</p> <p>11 estimate.</p> <p>12 Q. Thank you, Professor Keyes.</p> <p>13 I don't think I have any questions now.</p> <p>14 I may have at the end, if there's time.</p> <p>15 But thank you for your patience.</p> <p>16 EXAMINATION BY MR. PACK:</p> <p>17 Q. Good afternoon, Dr. Keyes.</p> <p>18 My name is Tom Pack. I am from the</p> <p>19 Greenberg Traurig firm and I represent</p> <p>20 Albertsons in this matter.</p> <p>21 Does that make sense?</p> <p>22 A. Yes.</p> <p>23 Q. And I understand that you've</p> <p>24 been deposed a number of times. We</p>

<p style="text-align: right;">Page 154</p> <p>1 talked about that earlier. 2 But like Mr. Essig, the one 3 instruction I will reiterate is if I'm 4 unclear about anything, can you ask me to 5 rephrase it? 6 A. Yes. 7 Q. And if I ask -- if you 8 answer, I'm going to assume that you 9 understood it. So that's a really 10 important instruction. 11 Does that make sense? 12 A. Yes. 13 Q. And I have a marked for the 14 record as Exhibit 4 your expert report in 15 Track 9. 16 (Deposition Exhibit Keyes 17 4, Expert Report of Katherine 18 Keyes April 15, 2024, was marked 19 for identification.) 20 Q. Can you take a brief look and 21 verify that that is your complete expert 22 report in this matter? 23 A. It looks to be my complete 24 report. If there's any section missing,</p>	<p style="text-align: right;">Page 156</p> <p>1 MR. PACK: I guess there's 2 is not an exhibit slip sheet 3 right there, but it's titled, "Bate 4 Stamped Documents," up at the 5 top. 6 A. Oh. 7 MS. do AMARAL: Oh, yes. 8 A. I'm in the wrong section. 9 MS. do AMARAL: So, on the 10 Exhibit 4 document that you've 11 handed over, Counsel -- 12 A. Oh, I see. 13 MS. do AMARAL: -- Exhibit B 14 is the whole materials considered 15 list. 16 And then I think you're 17 referring to -- there is a page 18 number where it starts Bates numbers 19 -- Bate stamped documents. 20 MR. PACK: Uh-huh. 21 MS. do AMARAL: That's 99; 22 is that what you're referring to? 23 MR. PACK: Yes. 24 MS. do AMARAL: Okay.</p>
<p style="text-align: right;">Page 155</p> <p>1 we can address as we go along. 2 Q. And, as of today, does this 3 report reflect all of the opinions that 4 you've formed in this case? 5 A. As of today, these are my 6 opinions, yes. 7 Q. And since the date of your 8 report, have there been any changes to 9 any of your opinions? 10 A. No. 11 Q. And sitting here today do you 12 intend to offer any opinions at the trial 13 of this case that have not been disclosed 14 in your report? 15 A. Not sitting here today, no. 16 Q. Okay. On Page 99, I think, 17 it's sort of the second section. It's 18 sort about 250 pages in, there is an 19 extensive "Materials Considered" list. 20 A. Yes. 21 MS. do AMARAL: Counsel, 22 you're referring to Exhibit C? 23 A. Exhibit B. 24 MS. do AMARAL: Exhibit B?</p>	<p style="text-align: right;">Page 157</p> <p>1 Q. With the exception of the 2 supplemental materials, which we will 3 discuss briefly, did those constitute all 4 the documents you considered at the time 5 of your report? 6 A. The documents that I 7 considered at the time include these Bate 8 stamped documents, as well as the other 9 materials considered and all the sources 10 that are listed in my reference section 11 of both sections of the report. 12 Q. And does that universe of 13 documents constitute all the documents 14 you considered at the time of your 15 report? 16 A. I would only add to that that 17 as an epidemiologist, I am constantly 18 reviewing literature. And so I have also 19 a general knowledge base that is 20 accumulating. But the references that 21 are in -- that are listed here constitute 22 the sources that I relied upon 23 principally in forming my opinions. 24 Q. Are you aware of any specific</p>

<p style="text-align: right;">Page 158</p> <p>1 materials that are missing from this 2 list? 3 A. There is -- when I was 4 reviewing in preparation for this, there 5 is a study that I talk about in the gen 6 report that I neglected to put on the 7 reference list. So I just want to -- 8 that was just a typo on my part. But I 9 wanted to raise it. 10 Q. And do you recall which study 11 that was? 12 A. The first author is Dash, 13 D-A-S-H. 14 Q. Okay. 15 A. It should have been, I think, 16 reference 224 around there and it just -- 17 I like left off of a note. 18 Q. Anything else come to mind? 19 A. No. 20 Q. And then I'm going to mark as 21 Exhibit 5 a "Supplemental Materials 22 Considered" list that was received 23 yesterday. 24 (Deposition Exhibit Keyes</p>	<p style="text-align: right;">Page 160</p> <p>1 to the extent that Albertsons produced 2 those data to the databases that I 3 reviewed, I would say those were 4 Albertsons produced material. 5 Q. I apologize. "Produced" in 6 this is little bit term of art here. It 7 means produced in the discovery of this 8 litigation. 9 So, with that context, do you 10 recall reviewing any documents produced 11 by Albertsons in this case? 12 MS. do AMARAL: Objection, 13 calls for a legal conclusion and 14 seeks privilege. 15 A. Again, I -- to be honest, 16 with you, I don't know exactly who 17 produced what documents. So, I, guess my 18 most accurate answer is, I don't know. 19 Q. But, again, all the documents 20 that you considered apart from your 21 general epidemiological knowledge and the 22 Dash Study that you just mentioned are 23 included in this report in the 24 "Supplemental Materials Considered" list,</p>
<p style="text-align: right;">Page 159</p> <p>1 5, Dr. Katherine Keyes Supplemental 2 Materials Considered, was marked 3 for identification.) 4 A. And, I guess, I should add 5 that sitting here today, I, also, relied 6 on the supplemental materials considered. 7 I thought that was included in this. 8 Q. Yes. 9 A. I apologize. 10 Q. And in your report and in the 11 "Supplemental Materials Considered" list, 12 which was produced yesterday, no document 13 that produced by any Defendant including 14 Albertsons appears, correct? 15 A. I don't know who produced 16 what document, to be completely honest 17 with you. But the Bates Stamped 18 documents do not have Albertsons listed 19 on them. 20 Q. Do you recall reviewing any 21 documents that were produced by 22 Albertsons in this matter? 23 A. I have reviewed data that 24 includes Albertsons specific data. So,</p>	<p style="text-align: right;">Page 161</p> <p>1 correct? 2 A. Yes. 3 Q. Great. 4 And in terms of who prepared the 5 "Supplemental Materials" list, is your 6 testimony as to Track 9 the same as it 7 was to Track 8, in terms of what you 8 provided -- what you stated for Mr. 9 Essig? 10 A. Yes. 11 Q. And, in general, I'm going to 12 try to streamline things by asking more 13 or less if you can just confirm that what 14 you said as to Track 8 applies to Track 15 9. So please expect a fair bit of that, 16 but, also, let me know if there's 17 anything that's different. 18 Does that make sense? 19 A. Yes. 20 Q. And then you also provided 21 testimony as to the compilation of your 22 list of references in Track 8. 23 Does that apply to Track 9 as well? 24 A. Yes.</p>

<p style="text-align: right;">Page 162</p> <p>1 Q. Okay. And I suspect we might</p> <p>2 discuss a little bit more down regarding</p> <p>3 the experts you considered in Tarrant</p> <p>4 County with respect to notes you might</p> <p>5 have.</p> <p>6 But, as in Track 8, you don't have</p> <p>7 any general notes underlying your report</p> <p>8 in the Track 9 matter?</p> <p>9 A. The notes that I have pertain</p> <p>10 to my meetings with the folks that I</p> <p>11 named in the report and those are the</p> <p>12 only notes that I took.</p> <p>13 Q. Okay. And do you have any</p> <p>14 issue producing those to us?</p> <p>15 A. No.</p> <p>16 Q. Great.</p> <p>17 And have you spoken to any other</p> <p>18 experts for Tarrant County regarding your</p> <p>19 opinions or this case?</p> <p>20 MS. do AMARAL: Objection,</p> <p>21 vague, calls for a legal conclusion.</p> <p>22 A. I don't believe so.</p> <p>23 Q. And, with regard to the</p> <p>24 "Supplemental Materials Considered" list,</p>	<p style="text-align: right;">Page 164</p> <p>1 billing practices in Track 9, as you</p> <p>2 followed in Track 8, in terms of what you</p> <p>3 mean by when you write "report" or</p> <p>4 "meeting"?</p> <p>5 A. Yes.</p> <p>6 Q. And I want to walk through</p> <p>7 these briefly.</p> <p>8 So the September 1st, 2023 invoice</p> <p>9 reflects six hours of work in Track 9?</p> <p>10 A. Yes.</p> <p>11 Q. And that's -- is that when</p> <p>12 you began writing your report in this</p> <p>13 matter?</p> <p>14 A. I believe so.</p> <p>15 Q. Okay. Are you aware of any</p> <p>16 work that you did on Track 9 prior to</p> <p>17 August 6, 2023?</p> <p>18 A. Sitting here today I don't</p> <p>19 remember any work prior.</p> <p>20 Q. And turning to the next page,</p> <p>21 September 1st, 2023 Caroline Rutherford</p> <p>22 invoice, when did Ms. Rutherford start</p> <p>23 billing Plaintiffs for her time?</p> <p>24 A. On Track 9?</p>
<p style="text-align: right;">Page 163</p> <p>1 Exhibit 5, did you review these documents</p> <p>2 since your April 15, 2024 report in this</p> <p>3 matter, or did you have access to them</p> <p>4 prior to that date?</p> <p>5 A. This is Exhibit 5, right?</p> <p>6 Q. Yes.</p> <p>7 A. I reviewed them after my</p> <p>8 report was submitted.</p> <p>9 Q. And have your review of these</p> <p>10 supplemental materials considered changed</p> <p>11 any of your opinions in any way?</p> <p>12 A. No, they corroborated the</p> <p>13 opinions that I produced in the report.</p> <p>14 Q. I'm going mark as Exhibit 6</p> <p>15 your invoices in this matter that were</p> <p>16 produced to us including the invoices of</p> <p>17 Ms. Rutherford.</p> <p>18 (Deposition Exhibit Keyes 6,</p> <p>19 three pages of invoices produced</p> <p>20 by Dr. Keyes in the Tarrant matter,</p> <p>21 was marked for identification.)</p> <p>22 THE WITNESS: Thank you.</p> <p>23 Q. And with regard to Track 9,</p> <p>24 do you and Ms. Rutherford follow the same</p>	<p style="text-align: right;">Page 165</p> <p>1 Q. Generally. I don't think I</p> <p>2 remember seeing any invoices for her</p> <p>3 prior to the Track 8/Track 9 matter.</p> <p>4 A. Yes, she's been working with</p> <p>5 my since Case Track 1.</p> <p>6 Q. And she's been billing</p> <p>7 separately that whole time?</p> <p>8 A. Yes.</p> <p>9 Q. Okay. And do you recall</p> <p>10 whether her rate has increased during</p> <p>11 that time period?</p> <p>12 A. Yes, it has.</p> <p>13 Q. Do you recall what her rate</p> <p>14 had been at the beginning of the Track 1</p> <p>15 case, for example?</p> <p>16 A. I don't recall.</p> <p>17 Q. Okay. And do her billings go</p> <p>18 to her or to Columbia?</p> <p>19 A. They go to her.</p> <p>20 Q. And then moving on there's a</p> <p>21 March 30th, 2024 invoice reflecting March</p> <p>22 time.</p> <p>23 Do you see that?</p> <p>24 A. Yes.</p>

<p style="text-align: right;">Page 166</p> <p>1 Q. First of all, do you recall 2 doing any work on Track 9 between 3 August 9, 2023 and March 26, 2024? 4 A. I don't recall. And if I 5 didn't submit an invoice, I would say 6 there's a low likelihood that I did. 7 Q. And what I'm getting at is I 8 know that there were invoices perhaps 9 missing in the other case and I just want 10 to make sure that I'm covering all the 11 basis that there is not an invoice 12 missing here? 13 A. We can double-check. 14 Q. Yes. 15 A. I'm not sure. 16 Q. And so, on this March 30th, 17 2024 invoice, there are two half hour 18 meetings noted. 19 Do you recall who those were with? 20 A. Those are listed in my report. 21 Q. Is that Dr. Johnson and Dr. 22 Zemrus? 23 A. Yes. 24 Q. Okay.</p>	<p style="text-align: right;">Page 168</p> <p>1 particular expertise in how the data are 2 assembled and how the validity of the 3 data can be confirmed. And then the 4 Plaintiffs Counsel will identify the 5 appropriate person based on what I have 6 requested. 7 Q. And do you recall if these 8 meetings were on Zoom or on the telephone 9 or in person? 10 A. They were on Zoom. 11 Q. Okay. And was anyone else on 12 these calls with you? 13 A. Yes. 14 Q. Who else was on the calls 15 with you? 16 A. Paulina and other Plaintiffs' 17 Counsel and Caroline Rutherford as well. 18 Q. Anyone else on those calls? 19 A. I don't think so. 20 Q. And other than Dr. Johnson 21 and Dr. Zemrus, did you speak to anyone 22 else in Tarrant County, who is affiliated 23 with Tarrant County? 24 A. Not -- not that I can remember</p>
<p style="text-align: right;">Page 167</p> <p>1 MS. do AMARAL: Counsel, can I 2 just clarify one thing? 3 It looks like there are two 4 invoices listed as March 30th. 5 Just -- so, to clarify, one of 6 them lists March dates and the 7 other one lists April dates. So, 8 I think, that was just a typo. 9 A. Couple typos there. 10 MR. PACK: You saved me a 11 couple of questions there. Thank 12 you. 13 MS. do AMARAL: Happy to help. 14 Q. And how did those individuals 15 -- how were those individuals identified 16 to you? 17 A. Similar to Case Track 8, 18 typically, when I'm writing a report, I 19 outline additional information that would 20 help me form my opinions or corroborate 21 additional data sources. 22 So, for example, I, typically, ask 23 to speak to the Medical Examiner and 24 other folks in the county who might have</p>	<p style="text-align: right;">Page 169</p> <p>1 today. 2 Q. Is there anyone else you 3 asked to speak with or any topic area 4 that you asked to have covered that was 5 not covered? 6 A. No. 7 Q. And this reflects seven hours 8 of report writing time and one hour of 9 meeting time, correct? 10 A. Yes. 11 Q. And turning to the next page, 12 we just discussed this. This is a 13 March 30th invoice, but it's for April 14 time. 15 And this invoice reflects two -- 16 well, one meeting and then one meeting 17 report entry. 18 And do you recall who the April 8th 19 meeting was with? 20 A. I don't. 21 Q. Do you recall meeting with 22 anyone in Tarrant County in April of 23 2024? 24 A. I'm sure there were meetings</p>

<p style="text-align: right;">Page 170</p> <p>1 that included Tarrant County people. I 2 just don't remember exactly who I was 3 meeting with on that particular day. 4 Q. Okay. Do you know if you met 5 with Dr. Johnson or Dr. Zemrus more than 6 once? 7 A. Yes. 8 Q. How many times did you meet 9 with each person? 10 A. Dr. Johnson, I believe, I met 11 with twice. 12 And Dr. Zemrus, I believe, I met 13 with once. 14 Q. Okay. So we have three 15 meeting entries standing alone, which 16 would cover two meetings with Dr. Johnson 17 and one with Dr. Zemrus. 18 Do you recall what the other meeting 19 entry on April 12th was or whether it was 20 a different person you met with on 21 April 8th? 22 A. It could have been a meeting 23 with the lawyers. 24 Q. But sitting here today, you</p>	<p style="text-align: right;">Page 172</p> <p>1 Was this number included in that 2 calculation? 3 A. Yes. 4 Q. Okay. And do you know about 5 how much time in Track 9 you've billed 6 since April 15th? 7 A. I haven't prepared an invoice 8 for this month. 9 Q. And I'm going to endeavor not 10 to cover ground already tread in this and 11 many other prior depositions, but there 12 are just some things I need to confirm as 13 to this case and jurisdiction. So please 14 bear with me. 15 And the first one is when I refer 16 to "Albertsons," Albertsons has multiple 17 brands. And so I am going to use that 18 term to refer to the brands Albertsons, 19 Safeway, Bonds, Jewel-Osco, Shaw's, Acme, 20 Tom Thumb, Randalls, United Supermarkets, 21 Pavilions, Star Market, Haggen, Carrs, 22 King Food Markets and Balducci's Food 23 Lovers Market. 24 That's a long list. If at anytime</p>
<p style="text-align: right;">Page 171</p> <p>1 don't remember speaking with anyone in 2 particular at Tarrant County apart from 3 Dr. Johnson and Dr. Zemrus? 4 A. That's right. 5 Q. And this invoice reflects 6 11 hours of either report time or mixed 7 meeting and report time; is that correct? 8 MS. do AMARAL: Objection; 9 Eleven and a half. 10 A. Eleven and a half, yeah. 11 Q. Oh, I was separating out, 12 though, meeting alone entry, excuse me. 13 A. Ah, okay. 14 Yes, 11 report or meeting/report 15 time .5 meeting time. 16 Q. And adding all of this up, for 17 total pre-report time, I have 25.5 hours 18 or \$17,850 in billings just for you. 19 Does that sound right? 20 A. It sounds about right. 21 Q. And earlier you testified 22 that you received I want to say between 23 350 and \$400,000 in total in the opioid 24 litigation.</p>	<p style="text-align: right;">Page 173</p> <p>1 you're confused about what I'm referring 2 to, can you ask me? 3 A. Yes. 4 Q. But thinking through that 5 list, do you recall ever shopping at one 6 of those brands? 7 A. To be honest with you, as you 8 were going through the list, I don't 9 recall sitting ever shopping at any of 10 those; maybe Safeway. But it would not 11 be -- it would be a rare event, in any 12 case. 13 Q. Not memorable it sounds like? 14 A. No. 15 Q. And do you know if you ever 16 obtain a prescription at one of those 17 brands? 18 A. No, definitely not. 19 Q. And so, in looking through 20 your report, you don't reference any 21 personal experience with Albertsons or 22 one of that long list of brands. 23 So is it fair to say that you don't 24 intend to offer testimony stemming from</p>

<p style="text-align: right;">Page 174</p> <p>1 your personal experience with Albertsons</p> <p>2 as defined?</p> <p>3 A. Correct.</p> <p>4 Q. And would you agree that your</p> <p>5 Track 9 expert report does not list any</p> <p>6 single pharmacy defendant by name?</p> <p>7 A. The report includes data that</p> <p>8 was produced by the Pharmacy Defendants</p> <p>9 and so the data that is in the report is</p> <p>10 germane to Albertsons and Publix. But I</p> <p>11 don't use the word "Albertsons" in the</p> <p>12 report.</p> <p>13 Q. And is that because the data</p> <p>14 you're talking about -- I mean, you're</p> <p>15 only looking at an aggregate form, as to</p> <p>16 pharmacies generally, or do you ever pull</p> <p>17 up information regarding specific</p> <p>18 pharmacy brands or chains of pharmacies?</p> <p>19 A. The data that I'm reviewing,</p> <p>20 for the most part, does combine different</p> <p>21 data sources from different pharmacies.</p> <p>22 There are several studies that have</p> <p>23 separated out specific pharmacy brands</p> <p>24 that I believe are cited in the health</p>	<p style="text-align: right;">Page 176</p> <p>1 Q. In the sense that had you</p> <p>2 gone and reviewed the data you referenced</p> <p>3 by pharmacy brand and done any independent</p> <p>4 analysis by brand?</p> <p>5 A. The data that I have reviewed</p> <p>6 in the report analyze a broad range of</p> <p>7 pharmacy brands aside from the several</p> <p>8 that I mentioned that reference specific</p> <p>9 pharmacy brands. And I have not</p> <p>10 independently analyzed any specific</p> <p>11 pharmacy brand.</p> <p>12 Q. And would you agree that</p> <p>13 while your report discloses some</p> <p>14 opinions, which relate to pharmacies,</p> <p>15 generally, that your report discloses no</p> <p>16 opinions regarding any specific pharmacy</p> <p>17 or chain of pharmacies?</p> <p>18 A. I would say that my opinions</p> <p>19 are specific to the Pharmacy Defendants</p> <p>20 in this case because of the data that I</p> <p>21 reviewed that includes data that are</p> <p>22 specific to these Defendants.</p> <p>23 Q. But looking at the writing of</p> <p>24 your report, again, there's no mention of</p>
<p style="text-align: right;">Page 175</p> <p>1 economic section. But I don't think</p> <p>2 Albertsons was one of those chains.</p> <p>3 Q. And do you know if any of</p> <p>4 that data would be specific to Tarrant</p> <p>5 County at all?</p> <p>6 A. It is specific to Tarrant</p> <p>7 County in that there is Tarrant County</p> <p>8 data in the databases.</p> <p>9 Q. But do you know if those</p> <p>10 studies that you reference break down the</p> <p>11 data by county such that you can go pull</p> <p>12 information regarding any particular</p> <p>13 pharmacy chain in Tarrant County?</p> <p>14 A. You, certainly, could using,</p> <p>15 for example, the ARCOS publically</p> <p>16 available data find data that are</p> <p>17 specific to Tarrant County. And that is</p> <p>18 -- ARCOS data are cited in this report.</p> <p>19 And there are a number of different</p> <p>20 analyses that provide county level data</p> <p>21 and association.</p> <p>22 Q. But prior to writing your</p> <p>23 report, had you done so?</p> <p>24 A. Done?</p>	<p style="text-align: right;">Page 177</p> <p>1 any one specific pharmacy, correct?</p> <p>2 MS. do AMARAL: Objection,</p> <p>3 asked and answered.</p> <p>4 A. I think, yeah, I would have</p> <p>5 the same answer in that, I believe, some</p> <p>6 of the studies do report on specific</p> <p>7 pharmacies and there are specific</p> <p>8 pharmacies that are contributing to data</p> <p>9 that I reviewed. But the word</p> <p>10 "Albertsons" does not appear in my</p> <p>11 report.</p> <p>12 Q. And have you conducted</p> <p>13 analyses of data in connection with this</p> <p>14 report that differ, for example, between</p> <p>15 independent pharmacies and retail chain</p> <p>16 pharmacies, any analysis comparing the</p> <p>17 two?</p> <p>18 MS. do AMARAL: Objection,</p> <p>19 vague.</p> <p>20 A. I believe that some of the</p> <p>21 papers that I have cited in this report,</p> <p>22 specifically, in the pharmacy shopping</p> <p>23 section do provide some level of detail</p> <p>24 to retail versus independent pharmacies.</p>

<p style="text-align: right;">Page 178</p> <p>1 And I was just reviewing it. So I think</p> <p>2 there are several that make that</p> <p>3 distinction in the results that they have</p> <p>4 posted.</p> <p>5 Q. But apart from those studies</p> <p>6 have you done any analysis comparing</p> <p>7 independent pharmacies and retail chain</p> <p>8 pharmacies?</p> <p>9 MS. do AMARAL: Objection,</p> <p>10 vague.</p> <p>11 A. The analysis that I've done</p> <p>12 is of the scientific literature.</p> <p>13 Q. And, specifically, that listed</p> <p>14 in your report, which you just referenced?</p> <p>15 A. Yes.</p> <p>16 Q. And before we get to your</p> <p>17 opinions in Track 9, the data underlying</p> <p>18 the Tarrant County report seems to have</p> <p>19 been calculated in a very similar manner</p> <p>20 to your Cobb County report; is that a</p> <p>21 fair statement?</p> <p>22 A. Yes.</p> <p>23 Q. Likewise, your methodology</p> <p>24 for calculating your opinion regarding</p>	<p style="text-align: right;">Page 180</p> <p>1 A. My approach to the analysis</p> <p>2 was similar and the methodology was</p> <p>3 similar. Again, different issues arise.</p> <p>4 And the other thing that I would</p> <p>5 add to it is that I -- in short, in each</p> <p>6 report that I compare and corroborate the</p> <p>7 evidence that is provided. And so there</p> <p>8 were some differences in terms of the</p> <p>9 available data between the two counties</p> <p>10 of what data sources were available,</p> <p>11 local data sources for corroboration and,</p> <p>12 also, differences in the people that I</p> <p>13 interviewed, obviously, to confirm.</p> <p>14 So I would say there were notable</p> <p>15 differences in the execution of the</p> <p>16 methods. But the overall approach of</p> <p>17 using the Larney analysis, using</p> <p>18 confirmatory data sets to corroborate the</p> <p>19 numbers that I have, that general</p> <p>20 methodology is consistent.</p> <p>21 Q. And those differences would</p> <p>22 be reflected in your written report in</p> <p>23 Track 9, correct?</p> <p>24 A. Yes.</p>
<p style="text-align: right;">Page 179</p> <p>1 the impact of opioids on Tarrant County,</p> <p>2 that methodology seems to be really</p> <p>3 similar to the methodology used in Cobb</p> <p>4 County; is that fair?</p> <p>5 MS. do AMARAL: Objection,</p> <p>6 vague.</p> <p>7 A. In general, yes. There is</p> <p>8 some differences in terms of the numbers.</p> <p>9 For example, you know what years were</p> <p>10 suppressed in the counties and things</p> <p>11 like that. So there are some differences</p> <p>12 in how we approached each of the counties</p> <p>13 based on the available data. However, the</p> <p>14 methodology -- the general methodology</p> <p>15 that I used is consistent between the two</p> <p>16 counties.</p> <p>17 Q. And so, for example, when you</p> <p>18 were talking about the Larney calculations</p> <p>19 and the sources of certain data, if those</p> <p>20 are referenced in both Track 8 and Track</p> <p>21 9, is it fair to say your analysis in</p> <p>22 both cases was similar?</p> <p>23 MS. do AMARAL: Objection,</p> <p>24 vague.</p>	<p style="text-align: right;">Page 181</p> <p>1 Q. Okay. And I'm generally</p> <p>2 trying to avoid having to go through all</p> <p>3 those spreadsheets and make you say,</p> <p>4 yeah, that's the same as Cobb.</p> <p>5 Does that make sense?</p> <p>6 A. Yeah, but we can -- I'm fine</p> <p>7 with that.</p> <p>8 Q. I do want to ask a couple of</p> <p>9 questions about the spreadsheet, which,</p> <p>10 hopefully, will not involve me taking</p> <p>11 them all out and going through them line</p> <p>12 by line.</p> <p>13 There was a spreadsheet produced to</p> <p>14 us last week titled, "Track 9 Expert</p> <p>15 Report Input Calculations 07/18/23."</p> <p>16 Do you know if you created that</p> <p>17 spreadsheet?</p> <p>18 A. Either myself or Caroline</p> <p>19 Rutherford created the spreadsheet.</p> <p>20 Q. And you testified that in</p> <p>21 Track 8 that you worked collaboratively</p> <p>22 with Ms. Rutherford on, basically, all of</p> <p>23 the calculations in the spreadsheets; is</p> <p>24 that a fair statement?</p>

<p style="text-align: right;">Page 182</p> <p>1 A. Yes.</p> <p>2 Q. Okay. And is that, also,</p> <p>3 true in Track 9?</p> <p>4 A. Yes.</p> <p>5 Q. And do you know if you</p> <p>6 conducted the data analysis on the</p> <p>7 spreadsheet in July of 2023, which is</p> <p>8 sort of what's indicated by the date</p> <p>9 07/18/23?</p> <p>10 MS. do AMARAL: Objection,</p> <p>11 vague, misstates the document.</p> <p>12 A. I'm not sure when the</p> <p>13 spreadsheet was created or when we</p> <p>14 conducted the analysis. We may have</p> <p>15 worked on it on that day. I'm not sure.</p> <p>16 Q. I'm asking just because I</p> <p>17 don't believe we have any invoices from</p> <p>18 that day and I'm trying to figure out if</p> <p>19 we're missing anything.</p> <p>20 And, in terms of the -- well, I</p> <p>21 think, we already have that covered.</p> <p>22 I'm going to ask you to turn to</p> <p>23 your Track 9 specific report, Schedule A.</p> <p>24 A. (The witness complies.)</p>	<p style="text-align: right;">Page 184</p> <p>1 Tarrant County data and performed that</p> <p>2 analysis and then didn't include it in</p> <p>3 your report?</p> <p>4 A. The analyses that I've done</p> <p>5 are all included in the report.</p> <p>6 Q. And moving onto Opinion 13,</p> <p>7 I'm trying to, again, not cover ground</p> <p>8 that's exactly been trot here.</p> <p>9 When you write, "confirm with local</p> <p>10 experts," does that include or does that</p> <p>11 refer to Dr. Johnson and Dr. Zemrus?</p> <p>12 A. Yes.</p> <p>13 Q. Anyone else?</p> <p>14 A. No.</p> <p>15 Q. And then moving onto Opinion</p> <p>16 14, the first sentence reads, "Data from</p> <p>17 Texas indicates that fentanyl mortality</p> <p>18 began increasing after 2013 with</p> <p>19 especially rapid increases after 2015.</p> <p>20 The increase in fentanyl mortality deaths</p> <p>21 can largely be attributed to the</p> <p>22 oversupply of prescription opioids that</p> <p>23 began in the 1990s and continues to the</p> <p>24 present time."</p>
<p style="text-align: right;">Page 183</p> <p>1 Q. Are you there?</p> <p>2 A. Yup.</p> <p>3 Q. So Opinion 12 -- first of</p> <p>4 all, does, Opinion 12 reflect data for</p> <p>5 all of Texas or is there anything that's</p> <p>6 specific to Tarrant County?</p> <p>7 A. I believe that Tarrant County</p> <p>8 is included in the Texas data.</p> <p>9 Q. But this reflects data from</p> <p>10 all of Texas and the numbers don't,</p> <p>11 specifically, reflect only Tarrant</p> <p>12 County, correct?</p> <p>13 A. Correct.</p> <p>14 Q. From the national data that's</p> <p>15 referenced in the second sentence, do you</p> <p>16 know if you're able to get to Tarrant</p> <p>17 County specific data from that national</p> <p>18 data?</p> <p>19 A. We would have to look at the</p> <p>20 source. If we pull it out, I can tell</p> <p>21 you if they -- if it's possible to pull</p> <p>22 out the specific Tarrant County number.</p> <p>23 Q. Sitting here today do you</p> <p>24 recall whether or not you looked for</p>	<p style="text-align: right;">Page 185</p> <p>1 Did I read that correctly?</p> <p>2 A. Yes.</p> <p>3 Q. And here as well, we're</p> <p>4 referring to data for all of Texas, which</p> <p>5 will include Tarrant County, but is not</p> <p>6 exclusively related to Tarrant County,</p> <p>7 correct?</p> <p>8 A. I have included data specific</p> <p>9 to Tarrant County for fentanyl overdose</p> <p>10 deaths in the figures that are provided</p> <p>11 in Schedule A. So I would say I am</p> <p>12 including Tarrant-specific data in that</p> <p>13 opinion.</p> <p>14 Q. And you use the term</p> <p>15 "oversupply."</p> <p>16 Do you have any opinion regarding</p> <p>17 whether prior to the increase in</p> <p>18 prescribing in the late 1990s the supply</p> <p>19 was appropriate to address legitimate</p> <p>20 prescribing needs?</p> <p>21 MS. do AMARAL: Objection,</p> <p>22 vague.</p> <p>23 A. In the literature that I</p> <p>24 reviewed in the section on oversupply in</p>

<p style="text-align: right;">Page 186</p> <p>1 the general report, I think, the consensus 2 based on the scientific literature is 3 that the difference in the early 1990s 4 supply and the late 1990s and 2000 supply 5 reflects oversupply. 6 But there has not been, to my 7 knowledge, an analysis of whether the 8 pre-1990s level was -- the extent to 9 which that was also an oversupply. But 10 we do know that the difference in the 11 1990s and 2000s largely reflected 12 oversupply. 13 Q. And so, as to the time period 14 prior to the late 1990s referenced in 15 your report, you have no -- you don't 16 intend to offer any opinion regarding the 17 appropriateness of the level of opioid 18 supplied at that time -- 19 MS. do AMARAL: Objection, 20 vague. 21 Q. -- is that fair? 22 A. What I have cited in the 23 report would not allow a conclusion -- or 24 I would have to review it again in order</p>	<p style="text-align: right;">Page 188</p> <p>1 preceded by heroin use in the United 2 States. And so the same pathway from 3 prescription opioid use to other illicit 4 opioid use that would include illicitly 5 manufactured fentanyl would be a 6 generalizable pathway. 7 Q. And is that more or less what 8 you discuss on Pages 4 and 5 of this 9 report? 10 And what, I mean, more specifically, 11 is a discussion at the top of Page 5 that 12 there is sufficient evidence to conclude 13 that prescription opioid use is a cause 14 of heroin and fentanyl use and, 15 approximately, 70 to 80 percent of 16 individuals who use heroin in the last 17 20 years began -- begin with prescription 18 opioids? 19 A. That is one section in which 20 the transition from prescription opioids 21 to heroin use and fentanyl use is 22 discussed. But it's discussed in much 23 more detail in other sections of the 24 report.</p>
<p style="text-align: right;">Page 187</p> <p>1 to know whether any studies have 2 specifically examined the pre-1990s level 3 of opioid prescribing. It's possible 4 that that is contained in the references 5 that I have included. And so, if I were 6 asked that opinion, that is an analysis 7 that I could do, but it's not currently 8 in the report. 9 Q. Okay. Skipping to the last 10 sentence of this report -- sorry, of this 11 Opinion 14, that reads, "Evidence 12 indicates that nonmedical opioid use 13 through diversion has the strongest 14 associations with transitions from 15 prescription opioids to heroin use and 16 thus associations with fentanyl exposed." 17 Did I read that right? 18 A. Yes. 19 Q. Can you explain what you mean 20 by "and thus associations with fentanyl 21 exposed"? 22 A. Yes. As I detail in the 23 report, the scientific evidence indicates 24 that the majority of fentanyl use is</p>	<p style="text-align: right;">Page 189</p> <p>1 Q. In the main report, correct? 2 A. And in the case specific 3 report. I think there's other references 4 throughout to that transition. 5 Q. I want to ask a lot -- a fair 6 bit of questions about this 70 to 7 80 percent figure. And, first of all, I 8 kind of want to figure out what you mean 9 by that. 10 So this references "70 to 11 80 percent of individuals who use heroin 12 in the last 20 years begin with 13 prescription opioids." 14 When you say, "the last 20 years" 15 there, what do you mean? Do you mean 16 going back from today 20 years? 17 MS. do AMARAL: Objection, 18 misstates testimony, the document 19 speaks for itself and it's vague. 20 A. Yes, I would just reiterate 21 what is written on the page. Heroin use 22 in the last 20 years began with 23 prescription opioids. And the date of 24 the report is 2004 -- 2024.</p>

<p style="text-align: right;">Page 190</p> <p>1 Q. And I want to cross-reference 2 back to Page 40 of your general report, 3 which discusses this in some more detail. 4 And we're looking at the second -- 5 sorry, the third paragraph on Page 40, 6 which starts with, "Numerous studies show 7 that, approximately, 70 to 80 percent of 8 individuals who used heroin in the last 9 25 years started their opioid use with 10 prescription opioids." 11 Are you there? 12 A. Yes. 13 Q. And so here we're talking 14 about 25 years. 15 So we're talking about 1999 to the 16 present? 17 A. Yes. 18 Q. And then you go on to list a 19 few studies from which you take this 20 information. 21 The Cicero study, the Lankenau 22 study, the Pollini study and the 23 Mateu-Gelabert study; is that correct? 24 A. And there are -- 1, 2, 3, 4,</p>	<p style="text-align: right;">Page 192</p> <p>1 it supports the 70 to 80 percent figure? 2 A. This particular sentence 3 isn't relevant to that figure. 4 Q. Okay. And which "particular 5 sentence" are you referring to? 6 A. I guess, the Veliz, et al, 7 2022 found in a national sample of 8 individuals followed longitudinally for 9 more than 30 years that "7.5 percent of 10 individuals who used prescription opioids 11 non-medically, also, reported heroin used 12 by age 50." 13 Q. I think I'm not in the same 14 spot you are. 15 A. Oh, I apologize. 16 Q. I'm Page 41 about four lines 17 in. And that's my fault. I should have 18 been clearer. 19 A. Okay. So Veliz, et al., 2022 20 analyzed data from 26,569 individuals who 21 started longitudinal follow-up at age 18 22 between 1976 and 1986 and were followed 23 from age 18 to age 50. Among those in 24 the cohort who started using heroin</p>
<p style="text-align: right;">Page 191</p> <p>1 5 -- at least, five on the first paragraph 2 of the next page and then two more in the 3 paragraph after that. And, I mean, the 4 section goes on for like -- 1, 2, 3, 4 -- 5 five pages after that paragraph but in 6 that paragraph, yes -- 7 Q. Well -- 8 A. -- with the addition of the 9 five that are on the page. 10 Q. And I'm interested in the 11 next page, in the sense that you mention 12 this is Veliz study, which is more 13 recent. 14 And I guess I'm not understanding 15 how that Veliz study supports the 16 proposition that 70 to 80 percent of 17 individuals who used heroin in the last 18 25 years started their opioid use with 19 prescription opioids. 20 A. Can we pull the study out? 21 Q. Well, I guess, what I sort of 22 want to do -- you describe it here. 23 So, based on the description of 24 your report, are you able to explain how</p>	<p style="text-align: right;">Page 193</p> <p>1 between age 18 and 50, 70.3 percent, 2 also, reported nonmedical prescription 3 opioid use. 4 Q. And, I guess, I'm trying to 5 figure out how that bolsters the idea 6 that 70 to 80 percent of individuals who 7 used heroin in the last 25 years started 8 their opioid use with prescription opioids 9 or started their heroin opioid use with 10 prescription opioids. 11 MS. do AMARAL: Objection, 12 misstates the report. 13 A. I think maybe what's confusing 14 is -- are you -- is it the 1976 to 1986 15 is longer than 25 years ago? 16 Q. Well, I'm trying to, 17 basically, figure out the -- 18 A. Cause I can -- 19 Q. The data sources that, 20 basically, underlie this first sentence 21 on -- that I reference on Page 40, "The 22 numerous studies show that, approximately, 23 70 to 80 percent of individuals who used 24 heroin in the last 25 years started their</p>

<p style="text-align: right;">Page 194</p> <p>1 opioid use with prescription opioids."</p> <p>2 A. Right. So these people</p> <p>3 started to be followed between 76 and 86,</p> <p>4 but they were followed for decades after</p> <p>5 that.</p> <p>6 Q. Yes.</p> <p>7 A. So you can calculate the</p> <p>8 proportion of people who started with</p> <p>9 prescription opioids in the last 25 years,</p> <p>10 because they were followed longitudinally</p> <p>11 for many decades after they were</p> <p>12 enrolled. They were enrolled in -- does</p> <p>13 that make sense?</p> <p>14 Q. Yes.</p> <p>15 And, I guess, I'm trying to get the</p> <p>16 connection between -- basically, the idea</p> <p>17 here is that most people in the last</p> <p>18 25 years who used heroin started with</p> <p>19 prescription opioids; is that your</p> <p>20 opinion?</p> <p>21 A. My opinion is that numerous</p> <p>22 studies showed that, approximately, 70 to</p> <p>23 80 percent of individuals who used heroin</p> <p>24 in the last 25 years started their opioid</p>	<p style="text-align: right;">Page 196</p> <p>1 MS. do AMARAL: Objection,</p> <p>2 vague.</p> <p>3 A. Can you point me to where</p> <p>4 that's written?</p> <p>5 Q. It's the second sentence of</p> <p>6 the last paragraph on Page 40.</p> <p>7 A. Okay. Cicero, et al., 2014</p> <p>8 demonstrated that among those who</p> <p>9 initiated opioids in the '60s and the</p> <p>10 '80s, less than one-third.</p> <p>11 I don't see that phrase here.</p> <p>12 Am I missing it.</p> <p>13 Q. It's the second sentence.</p> <p>14 "The most extensive report is from</p> <p>15 Cicero."</p> <p>16 A. Oh, I see. I'm so sorry.</p> <p>17 That is, I think, based on the</p> <p>18 combination of sample size and the time</p> <p>19 span.</p> <p>20 Q. Okay. And looking at these</p> <p>21 other studies, would you agree that</p> <p>22 Lankenau, Pollini and Mateu-Gelabert all</p> <p>23 are for substantially smaller sample</p> <p>24 sizes?</p>
<p style="text-align: right;">Page 195</p> <p>1 use with prescription opioids.</p> <p>2 Q. And so you would include the</p> <p>3 Veliz study as bolstering that?</p> <p>4 A. Yes.</p> <p>5 Q. I want to ask a few questions</p> <p>6 about the Cicero study, in particular.</p> <p>7 MR. PACK: Can I ask how much</p> <p>8 time we've been on the record?</p> <p>9 THE VIDEOGRAPHER: 3:09.</p> <p>10 MR. PACK: Which Exhibit</p> <p>11 are we up to?</p> <p>12 THE STENOGRAPHER: Exhibit</p> <p>13 6?</p> <p>14 No, Exhibit 7.</p> <p>15 (Deposition Exhibit Keyes 7,</p> <p>16 article entitled, "The Changing</p> <p>17 Face of Heroin Use in the United</p> <p>18 States a Retrospective Analysis</p> <p>19 of the Past 50 Years," authored</p> <p>20 by Cicero, et al., was marked for</p> <p>21 identification.)</p> <p>22 Q. And you reference this study</p> <p>23 as "the most extensive report."</p> <p>24 What did you mean by that?</p>	<p style="text-align: right;">Page 197</p> <p>1 A. Lankenau is 50 individuals,</p> <p>2 which is smaller than 2,797. Pollini is</p> <p>3 12, which is smaller than 2,797, and</p> <p>4 Mateu-Gelabert is 46, which is smaller.</p> <p>5 I would just, again, like to state</p> <p>6 that there's five more studies cited on</p> <p>7 the next page, too.</p> <p>8 Q. And looking at the data, the</p> <p>9 analysis, the "Method" section, second</p> <p>10 column of Page 822, these -- The Skip</p> <p>11 data, which is by far the most numerous</p> <p>12 set of data in this report, were analyzed</p> <p>13 through the third quarter of 2013,</p> <p>14 correct? Do you see that?</p> <p>15 A. Okay. The Skip data were</p> <p>16 analyzed from the third quarter 2010 to</p> <p>17 the third quarter of 2013, yes.</p> <p>18 And the Rapid Interview was during</p> <p>19 the fourth quarter of 2013.</p> <p>20 Q. And so all of the data</p> <p>21 underlying this article, which you said</p> <p>22 is the most extensive report, is, at</p> <p>23 least, ten years old; is that correct?</p> <p>24 A. Yes, that's why I cited about</p>

<p style="text-align: right;">Page 198</p> <p>1 ten more studies in just that paragraph 2 but then went on for another five pages, 3 because it's the totality of all those 4 studies together that provide the 5 evidence underlying the opinion. 6 Q. But Pollini and Lankenau 7 necessarily by their dates of publication 8 must involve older data, correct? 9 A. Yes. And Veliz 2022, it 10 provides newer data. You know, that's 11 why you kind of -- you really need to 12 look at all of the studies together. 13 Because I tried to fill in the different 14 windows of time across that entire time 15 span, such that any one study might be 16 covering a smaller sliver than the 17 totality of the evidence. 18 Q. And, at least, in one place 19 in your report -- and I apologize that 20 we're moving around, but it's the nature 21 of -- 22 A. That's okay. 23 Q. -- of a general report and 24 then a specific report.</p>	<p style="text-align: right;">Page 200</p> <p>1 reasonable estimate from that range. 2 Q. To estimate the top of the 3 range? 4 A. Yeah. 5 Q. And what is that based on? 6 A. What is what based on? 7 Q. Your decision to just use the 8 top of the range rather than any other 9 point in the range? 10 A. That's a standard practice in 11 epidemiological literature that you 12 provide an range and provide an estimate 13 somewhere in that range. 14 Q. So anywhere in the range is 15 fair game? 16 A. It would depend on what 17 purpose the estimate is used for, in the 18 epidemiological literature. 19 Q. Well, how about here, this 20 number? 21 A. I think that's an estimate of 22 the number of new heroin initiates. I 23 think that that's a fair estimate based 24 on the range that I provided.</p>
<p style="text-align: right;">Page 199</p> <p>1 (Continuing.) Page 18 of your 2 specific report -- 3 A. (The witness complies.) 4 Q. -- do you see where about 5 midway of the page you say, "Given that 6 an estimated 70 to 80 percent of those 7 initiating heroin began with prescription 8 opioids and that would indicate that 9 996,930 new heroin initiates transitioned 10 from N.M.U.P.O. to heroin during that 11 time period." Do you see that? 12 A. Yes. 13 Q. And you consistently 14 reference "70 to 80 percent." 15 Do you know what number 996,930 16 represents as a percentage of 1,254,000? 17 A. I can't do that math in my 18 head. 19 Do we have a calculator here? 20 Q. I crunched it. It's 80. 21 I mean, I guess, what I want to 22 know is why did you pick 80, when you 23 consistently use a range of 70 to 80? 24 A. I think that that is a</p>	<p style="text-align: right;">Page 201</p> <p>1 Q. Would 70 percent, also, be a 2 fair estimate? 3 A. It would depend on the 4 purpose that one was using the 7/8 5 percent for. 6 Q. Well, I guess, if you just 7 replace this 996,930 number with one that 8 reflects 70 percent, would that still be 9 a fair opinion to hold? 10 A. In this case, yes, because 11 the 1,254 [sic] is itself a minimum and 12 an under estimate. And so, I think, in 13 that case, given that the other number is 14 so conservative, it's likely that using 15 an upper bound of the range would provide 16 -- well, I would just say that the using 17 the lower bond of the range would provide 18 a number that would be too conservative. 19 So this would be standard epidemiological 20 practice based on that. 21 Q. And... 22 So you're, essentially, saying that 23 because the 12 -- 1,254 -- sorry, 24 1,254,000 is a conservative number,</p>

<p style="text-align: right;">Page 202</p> <p>1 you're allowed to just go to the top end 2 of the range when you have an estimate? 3 A. That's not what I said. 4 MS. do AMARAL: Yeah -- I'm 5 sorry. 6 Objection, misstates the 7 testimony. 8 Q. I'm trying to understand that. 9 Can you -- can you say that again 10 then? 11 A. What I said was that I used 12 standard epidemiological techniques for 13 reporting on estimates from ranges of 14 data. And in this circumstance, because 15 the estimates from Figure 1 of Muhuri, 16 there was a minimum of 1,254,000 new 17 heroin initiates during that period and 18 then we know that the NSDUH data to be 19 underestimate, it would be a standard 20 epidemiological practice when selecting 21 something from the range to choose 22 something that's on the upper end of the 23 range to try to provide some correction 24 for the under estimation of the</p>	<p style="text-align: right;">Page 204</p> <p>1 opioids, correct? 2 A. Yes. 3 Q. And I'm asking if you know if 4 that number or have you seen any studies 5 that indicate that that number varies 6 depending on a heroin user's race or 7 ethnicity? 8 A. I believe Figure 3 of the 9 Cicero study stratifies by race and 10 ethnicity, correct? 11 Q. And what is your 12 interpretation of Figure 3 of the Cicero 13 study? 14 A. For white respondents, the 15 percentage of heroin users who start with 16 prescription opioids -- wait, no, this is 17 -- let me just... 18 Let's go to the "Results" section. 19 Figure 3, heroin users who started 20 their opioid use in the 60s were 21 primarily men. 22 And there was a dominance of white 23 users in 2010. 24 So, I guess, no, that's not -- I</p>
<p style="text-align: right;">Page 203</p> <p>1 underlying input. 2 Q. And so, if you scrubbed out 3 the No. 996,930 and put in 877,800, which 4 is 70 percent, in your view, would that 5 be an inappropriate number? 6 MS. do AMARAL: Objection, 7 asked and answered and vague. 8 A. Again, it would be -- depend 9 on what you're using that number for. 10 Q. Well, I mean, it's used for 11 the purpose of given in the sentence. 12 MS. do AMARAL: Same 13 objection. 14 A. I've described what a 15 standard epidemiological approach would 16 be. And that's what I used. 17 Q. Are you aware of any studies 18 indicating difference in whether a heroin 19 user initiates the prescription opioids 20 or not based on race or ethnicity? 21 A. I don't think I understand 22 the question. 23 Q. So you say 70 to 80 percent 24 of heroin users initiate with prescription</p>	<p style="text-align: right;">Page 205</p> <p>1 apologize. That's not relevant to the 2 question that you asked. 3 I would need to go through the 4 other -- I only have this one in front of 5 me. So I would need to go through the 6 studies again to see if there are racial 7 differences in those percentages. 8 Q. Do you recall -- oh, sorry. 9 Sitting here today do you recall 10 any, in particular, that might have that 11 analysis? 12 A. I'm sure there have been. I 13 would need to go through the studies 14 again. 15 Q. But looking at Figure 1 and 16 comparing it to Figure 3, do you see a 17 correlation in the sense that as the 18 decades go on, the -- in Figure 1, the 19 instance of a user's first choice of drug 20 being a prescription opioid goes up and 21 as the years go on, in Figure 3, the 22 racial distribution of heroin users gets 23 more white? 24 Are both of those things true?</p>

<p style="text-align: right;">Page 206</p> <p>1 MS. do AMARAL: Objection, 2 vague. 3 A. In Figure 1, what we see is 4 that the proportion of heroin dependent 5 people who starts with prescription 6 opioids increases across time. 7 In Figure 3, what we see is that 8 the distribution of heroin dependent 9 people who are white versus nonwhite, 10 also, changes across time. So that more 11 of the heroin dependent sample is white 12 in the 2010s. 13 But it does not show that the 14 proportion of people who start with 15 prescription opioids has a racial 16 difference. 17 Q. And that goes back to the 18 testimony that you gave that you would 19 need to check the studies to see if that 20 exists? 21 A. Yes. 22 Q. One follow-up point on 23 Figure 1. 24 Would you agree that the number who</p>	<p style="text-align: right;">Page 208</p> <p>1 are we at? 2 THE VIDEOGRAPHER: 3:24. 3 MR. ESSIG: We've been going 4 for like an hour. 5 Do you guys want to take a 6 quick break or... 7 MR. PACK: Yeah, that would 8 be fine. 9 MR. ESSIG: Let's take a 10 break. 11 THE VIDEOGRAPHER: We are off 12 the record. The time is 1:41 p.m. 13 (Recess taken 1:41 to 14 p.m.) 15 THE VIDEOGRAPHER: We are 16 back on the record. The time is 17 1:53 p.m. 18 Q. Dr. Keyes, do you understand 19 you're still under oath? 20 A. Yes. 21 Q. I am going to ask a couple of 22 questions generally about how demographics 23 work in your field. 24 If a study reports results on one</p>
<p style="text-align: right;">Page 207</p> <p>1 initiated with a prescription opioid went 2 down from the 2000s to the 2010s? 3 A. I don't know whether the 4 authors statistically tested whether 5 that's a statistically significant 6 change. 7 But the 2010 point estimate is 8 slightly lower than the 2000 point 9 estimate. 10 Q. And it went from about 11 74 percent to about 65 percent, roughly 12 speaking, if we can read these graphs 13 correctly? 14 A. I -- I don't know what the 15 point estimate is from this graph, but it 16 is between 60 and 70. 17 Q. And did you analyze the 18 demographic breakdown of Tarrant County, 19 Texas by race and ethnicity at all, in 20 connection with your report here? 21 A. I have not. 22 Q. Moving back to your opinion 23 section in Tarrant County. 24 MR. PACK: And what time</p>	<p style="text-align: right;">Page 209</p> <p>1 study population that reflects one set of 2 demographics and the population of, for 3 example, Tarrant County, Texas differed 4 significantly from that study population, 5 could that affect your analysis? 6 MS. do AMARAL: Objection, 7 vague. 8 A. It would really depend on the 9 analysis, that I couldn't answer that as 10 a blanket statement. 11 Q. So, for example, if the Cicero 12 study differed significantly, for example, 13 from Tarrant County, for example, because 14 Cicero's percentage of Latinos was six 15 times less than Tarrant County's and 16 Cicero's percentage of African Americans 17 represented in the study was half of 18 Tarrant County's, would that affect your 19 analysis? 20 A. In the question you're asking 21 is one about interaction. So the 22 question, I think, is whether there is 23 sufficient data to conclude that the 24 relationship between prescription opioid</p>

<p style="text-align: right;">Page 210</p> <p>1 use and later heroin use, for example, 2 differs by race. If it did, then two 3 places with very different racial 4 compositions, that would affect your 5 analysis. 6 However, in this matter, if you 7 look at the studies that are cited in 8 that section, I have confirmed that the 9 relationship between prescription opioid 10 use and later illicit opioid use is 11 generalizable across races. 12 So, for this particular question, 13 I'm not worried about the fact that 14 Tarrant County is a different racial 15 distribution than what is in the Cicero 16 study. 17 Q. And what did you do to 18 confirm that -- sorry, I'm not -- I just 19 need to look at your answer to get to my 20 question. 21 What did you do to confirm that the 22 relationship between "prescription opioid 23 use and later illicit opioid use is 24 generalizable across races"?</p>	<p style="text-align: right;">Page 212</p> <p>1 Q. Can we go back to Page 37 2 here. I'm trying to limit our 3 pingponging from specific to general from 4 specific to general -- 5 A. It's okay. 6 Q. -- given that we've done a 7 fair bit of that. 8 The paragraph beginning at the 9 bottom of Page 37 that begins with, 10 "Evidence indicates that prescription 11 opioid-related deaths, specifically, 12 those not involving other opioids had 13 declined in complement with the decline 14 in prescription opioids sales and 15 distribution in recent years." 16 Do you see that section? 17 A. I do. 18 Q. This section appears to be 19 new in this report. 20 Does that sound right to you? 21 A. Yes. 22 Q. And why was it included? 23 A. Because I had analyzed the 24 vital statistics data on deaths over time</p>
<p style="text-align: right;">Page 211</p> <p>1 A. The way we do that 2 epidemiologically is by evaluating a body 3 of literature with diverse sample 4 compositions and recruitment strategies. 5 Q. And you believe that the 6 studies you cited in this section of your 7 report represents a diverse sample 8 composition and recruitment strategy, it 9 represents that? 10 MS. do AMARAL: Objection, 11 vague, compound. 12 Q. Sorry, I can ask the 13 question. 14 And you believe that the studies 15 you cited in your report on Pages 40 and 16 41 represent a body of literature with 17 diverse sample compositions and 18 recruitment strategies? 19 A. This section goes to Page 45 20 and so I would say, if you examine the 21 studies from Page 40 to Page 45, yes, you 22 will find studies with a range of 23 different sample compositions and 24 recruitment strategies.</p>	<p style="text-align: right;">Page 213</p> <p>1 and it's a relevant it data point. You 2 know, if there is a causal relationship 3 between prescription opioid use and 4 death, as prescriptions have declined, 5 you know, you saw an increase in deaths 6 when prescriptions increased. 7 So I wanted to know whether the 8 data were, also, consistent with a 9 decline in deaths as prescriptions 10 decreased, as that is part of the 11 Bradford Hill criteria I used. So I 12 thought it was a relevant analysis to 13 include. 14 Q. And this is a general opinion 15 it's not specific to Tarrant County? 16 A. Tarrant County deaths are 17 included in the analysis that I did. 18 Q. But it, also, is generalizable 19 across the country in terms of that being 20 your opinion? 21 A. There are other counties that 22 are included in that estimate as well as 23 Tarrant County. 24 Q. But this isn't in the section</p>

<p style="text-align: right;">Page 214</p> <p>1 of your report that doesn't, specifically, 2 relate to Tarrant County, correct? 3 It's not your case specific 4 opinion, I guess, is what I'm trying to 5 get at. 6 A. This is not part of Schedule 7 A; however, I do believe that this 8 section is specific to Tarrant County in 9 that Tarrant County data are included in 10 the section. 11 Q. Alright. Now, I want to go 12 back to your Tarrant County report. 13 And, specifically, Opinion 15, 14 which reads, "In 2021, the last year of 15 data available, I estimate that for 16 prevalence of opioid use disorder is, 17 approximately, 2.1 percent in Tarrant 18 County." 19 Did I read that right? 20 A. Yes. 21 Q. And without waiving any 22 objection to the length of this 23 deposition, we -- I do think we've saved 24 a bit of time in that you testified that</p>	<p style="text-align: right;">Page 216</p> <p>1 there ever an objection to the 2 agreement. In fact, on behalf of 3 all Counsel, Meredith Thornburg 4 White addressed in an e-mail that 5 there is an agreement as to all 6 of the times that have been reached. 7 Q. So, as to the data in Opinion 8 15, you note that 2021 is the last year 9 of data available, correct? 10 A. Yes. 11 Q. And this report is dated 12 April 15, 2024, correct? 13 A. Yes. 14 Q. Did you look after the time 15 you began drafting -- or you drafted this 16 section of your report to see if 2022 17 data had been released yet? 18 A. They had not been released at 19 the time that this report was submitted. 20 Q. And I want to ask a few 21 questions about your figures specific to 22 Tarrant County. 23 So Figure 3 on Page 3, let me know 24 when you're there.</p>
<p style="text-align: right;">Page 215</p> <p>1 the inputs into the spreadsheet, the 2 Track 9 spreadsheet, and the analysis 3 with some variation are the same as in 4 the Track 8 matter. But I did have a few 5 specific questions about Track 9. 6 MS. do AMARAL: Counsel, I'm 7 sorry. We had an agreement about 8 the length of the deposition. 9 Are you saying that that's 10 not the case, that you are reserving 11 objections? 12 MR. PACK: I will say I 13 can't speak to the agreement that 14 was reached. 15 MS. do AMARAL: Well, I'll 16 put a note on the record that 17 parties agreed to the length of 18 this deposition at four hours. So 19 there shouldn't be any objections 20 pending with regard to the length 21 of the deposition. 22 MR. JANUSH: And I'm going 23 to put on the record as Counsel 24 for Track 9 that at no point was</p>	<p style="text-align: right;">Page 217</p> <p>1 A. I am there. 2 Q. Would you agree that the -- 3 well, first of all, the lines -- the dots 4 represent data points and the lines 5 represent moving averages; is that fair? 6 A. Yes. 7 Q. Would you agree that the 8 moving average for both Texas and Tarrant 9 County is significantly lower than the 10 moving average for the United States as a 11 whole, in terms of overdose death rates? 12 A. No. 13 MS. do AMARAL: Objection, 14 vague. 15 Q. And why do you disagree with 16 that? 17 A. For many of the years -- 18 first of all, for many of the years, 19 there's indistinguishable rates between 20 Texas and the overall nation. And then 21 for the most recent years, statistical 22 significance is a specific test that's 23 done on race and that was not performed 24 here. So I could not conclude that they</p>

<p style="text-align: right;">Page 218</p> <p>1 are significantly different.</p> <p>2 Q. Well, what is the -- for</p> <p>3 2021, the last year of analysis you did,</p> <p>4 what is the national moving average, even</p> <p>5 roughly speaking, if you have to be rough</p> <p>6 because of the size of the graph?</p> <p>7 A. Yeah, I don't -- I don't</p> <p>8 know, specifically, because I don't have</p> <p>9 the underlying spreadsheet.</p> <p>10 Q. Would you agree that it looks</p> <p>11 to be halfway between 20 and 30?</p> <p>12 MS. do AMARAL: Objection.</p> <p>13 A. In 2021?</p> <p>14 Q. Yes.</p> <p>15 A. I'm sorry, for the nation or</p> <p>16 for Texas?</p> <p>17 Q. For the nation.</p> <p>18 A. No, I would not agree.</p> <p>19 Q. Why not?</p> <p>20 A. Because the dot looks to be</p> <p>21 above 30.</p> <p>22 Q. No, I said "the moving</p> <p>23 average."</p> <p>24 A. Oh, I'm sorry. I thought you</p>	<p style="text-align: right;">Page 220</p> <p>1 than 15.</p> <p>2 MS. do AMARAL: Counsel, to</p> <p>3 the extent that you want to address</p> <p>4 more questions in this figure, I</p> <p>5 suggest that we look at the input</p> <p>6 calculation.</p> <p>7 Q. I'm going to move onto</p> <p>8 Figure 5.</p> <p>9 And these lines, also, represent</p> <p>10 moving averages and the dots represent</p> <p>11 data points; is that correct?</p> <p>12 A. That is correct.</p> <p>13 Q. And for overdose death rates</p> <p>14 on opioids, would you agree that the</p> <p>15 moving average nationally in 2021 is</p> <p>16 somewhere between 17 and a half and 20?</p> <p>17 MS. do AMARAL: Objection,</p> <p>18 vague.</p> <p>19 A. I would be able to conclude</p> <p>20 that it's between 15 and 20.</p> <p>21 Q. You don't see this creeping</p> <p>22 over that 17 and a half line?</p> <p>23 MS. do AMARAL: Objection,</p> <p>24 asked and answered.</p>
<p style="text-align: right;">Page 219</p> <p>1 meant the dot.</p> <p>2 Yes, "the moving average" is</p> <p>3 between 20 and 30.</p> <p>4 Q. And, likewise, the moving</p> <p>5 average for Texas and Tarrant County in</p> <p>6 2021, those are pretty close, correct?</p> <p>7 MS. do AMARAL: Objection,</p> <p>8 vague.</p> <p>9 A. Say the question again.</p> <p>10 Q. The moving averages for Texas</p> <p>11 in Tarrant County are pretty close in</p> <p>12 number in 2021, correct?</p> <p>13 MS. do AMARAL: Objection,</p> <p>14 vague.</p> <p>15 A. Again, I have not</p> <p>16 statistically tested the difference. So</p> <p>17 I can't -- I think -- we don't have</p> <p>18 enough information to answer the</p> <p>19 question.</p> <p>20 Q. But the numbers, though, the</p> <p>21 numbers on your chart, for 2021, the</p> <p>22 moving average for Tarrant County is</p> <p>23 south of 15, correct, lower than 15?</p> <p>24 A. The moving average is lower</p>	<p style="text-align: right;">Page 221</p> <p>1 Counsel, if you want to</p> <p>2 discuss the input data, you should</p> <p>3 put it before the witness.</p> <p>4 A. Because the Y axis is not</p> <p>5 marked, I would -- what I can state</p> <p>6 without looking at the input calculation</p> <p>7 is that it's between 15 and 20.</p> <p>8 Q. And as to Tarrant County,</p> <p>9 it's between 5 and 10?</p> <p>10 MS. do AMARAL: Same</p> <p>11 objection.</p> <p>12 A. The moving average for</p> <p>13 Tarrant County --</p> <p>14 Q. For 2021.</p> <p>15 A. -- for 2021 looks to be</p> <p>16 between 5 and 10.</p> <p>17 MR. PACK: What is our timing?</p> <p>18 THE VIDEOGRAPHER: 3:37.</p> <p>19 Q. And then moving onto Figure 7,</p> <p>20 this is the same analysis with regard to</p> <p>21 moving averages and data points, correct,</p> <p>22 in terms of what the lines and dots mean?</p> <p>23 A. In terms of what the lines</p> <p>24 and dots mean, the line is a moving</p>

<p style="text-align: right;">Page 222</p> <p>1 average. The dot is a data point. 2 Q. And so, for 2021, the moving 3 average for national overdose death rates 4 and prescription opioids is between -- 5 well, I think, it's clearly between 5 and 6 6, but you might say it's between 4 and 7 6. 8 MS. do AMARAL: Objection, 9 vague. 10 Q. Would you agree that it's 11 between 5 and 6? 12 MS. do AMARAL: Same 13 objection. 14 A. I think what we can conclude 15 from the figure the way it's presented is 16 that it's between 4 and 6. 17 Q. And then for Tarrant County, 18 2021 moving average less than two, 19 correct? 20 MS. do AMARAL: Objection, 21 vague. 22 A. I would need to see the input 23 calculation, but it's very close to the 24 two line.</p>	<p style="text-align: right;">Page 224</p> <p>1 that it's largely concomitant with opioid 2 use." 3 Did I read that right? 4 A. Yes. 5 Q. And so what do you mean in 6 this sentence by "opioid use," 7 specifically? 8 (Stenographer clarification.) 9 MR. PACK: Specifically. 10 A. I provide more detail in the 11 remaining paragraph. But, I mean, that, 12 for example, cocaine-related nonfatal 13 overdoses have increased but only where 14 an opioid was present. So cocaine-related 15 nonfatal overdose actually declined when 16 an opioid was not present. 17 And there are other examples in 18 that paragraph that provide evidence for 19 the statement that the increase in 20 stimulant overdose is really -- is very 21 connected to the opioid epidemic. 22 Q. And when you say, "presence 23 of an opioid," where does that data come 24 from in death cases?</p>
<p style="text-align: right;">Page 223</p> <p>1 MR. PACK: Let's take a brief 2 break. 3 THE VIDEOGRAPHER: We are off 4 the record. The time is 2:08 p.m. 5 (Recess taken 2:08 to 6 p.m.) 7 THE VIDEOGRAPHER: We are 8 back on the record. The time is 9 2:11 p.m. 10 Q. Dr. Keyes, are you aware 11 you're still under oath? 12 A. Yes. 13 Q. Can you turn to Page 22 of 14 your case specific report? 15 A. Yes. 16 Q. So I want to ask about the 17 sort of second paragraph of the section, 18 "stimulant death trends in the United 19 States and the contribution of opioids." 20 A. Okay. 21 Q. Beginning with, "Nonfatal 22 overdose from stimulants is also 23 increasing across the United States, 24 although available evidence indicates</p>	<p style="text-align: right;">Page 225</p> <p>1 A. Well, in this paragraph, 2 we're talking about nonfatal. So it's 3 not coming from death cases. 4 But there's other sections in the 5 report where we do include death cases. 6 Q. And do you know how the 7 information that an opioid was present 8 comes to be? Do you know where that data 9 comes from? 10 And I'm not trying to hide the 11 ball. 12 Does it come from toxicology 13 screens, do you know? 14 A. For the H. Cup data or for 15 the -- 16 MS. do AMARAL: Objection. 17 Q. For the H. Cup data. 18 A. For the H. Cup data, it's 19 based on hospital codes. 20 Q. And do you know where those 21 -- how those are calculated? 22 A. It -- there's a range of 23 information that clinicians use to make a 24 determination of the presence of a</p>

<p style="text-align: right;">Page 226</p> <p>1 specific substance. 2 Q. And this is national data, 3 correct? 4 MS. do AMARAL: Objection -- 5 A. This is -- 6 MS. do AMARAL: -- calls for 7 privileged testimony. 8 Go ahead. 9 A. This is nationwide emergency 10 department sample data. 11 Q. Okay. And are you aware of 12 reports of significant increases in 13 contamination of cocaine and 14 methamphetamine with fentanyl? 15 A. I am aware of data from, for 16 example, drug seizure sources that have 17 indicated that among drug seized, there 18 is more fentanyl in cocaine and 19 methamphetamine, for example. 20 Q. Did you consider that data in 21 forming your opinions in this case? 22 A. Yes. 23 Q. Did you cite any of those 24 studies in your -- in the report at all --</p>	<p style="text-align: right;">Page 228</p> <p>1 MR. ESSIG: Okay, great. 2 EXAMINATION BY MR. ESSIG: 3 Q. Professor Keyes, I have some 4 followup here. I think my first couple 5 here might be yes or no questions. 6 Your report does not contain any 7 opinion with a numerical calculation of 8 how many opioids were oversupplied in 9 Cobb County from 1999 to 2021, yes or no? 10 A. I would say it's not exactly 11 a yes or no question because the general 12 report contains information on numerical 13 calculations of opioid oversupply that 14 are specific to Cobb County. 15 But I did not provide a spreadsheet 16 with my own calculation. I relied on the 17 literature. 18 Q. Okay. So I'd like you then 19 to direct me to the section of your Cobb 20 County report that contains an opinion 21 with a numerical calculation of how many 22 opioids were oversupplied in Cobb County 23 from 1999 to 2021. 24 A. So the general section of my</p>
<p style="text-align: right;">Page 227</p> <p>1 A. Yes. 2 Q. -- that reflects contamination 3 of cocaine and methamphetamine with 4 fentanyl? 5 MS. do AMARAL: Objection. 6 You can answer, if you can. 7 A. Yes. 8 Q. Do you recall any offhand? 9 A. There are a number of reports 10 that are cited throughout the references, 11 the materials considered and the 12 supplemental materials considered list 13 that provide information on fentanyl 14 contamination. 15 Q. In cocaine and methamphetamine? 16 A. Yes. 17 MR. PACK: I'm going to turn 18 it over to Mr. Essig. Although I 19 might have some follow-up 20 questions, to the extent he has 21 any time left. 22 MR. ESSIG: Okay. Can you 23 hear me down here okay? 24 THE WITNESS: Yes.</p>	<p style="text-align: right;">Page 229</p> <p>1 report providers an overview of the 2 epidemiological literature that has 3 provided evidence underlying my opinion 4 that there was oversupply. 5 It is not in -- I did not do a 6 specific calculation for Schedule A. I 7 relied on the epidemiological literature 8 to support the opinion I'm offering. 9 Q. Okay. And I understand that 10 you have a general opinion about 11 oversupply of opioids. And I think you 12 just gave me the answer. 13 But there's no numerical calculation 14 where you sat down and said, this number 15 of opioids by MME or a number of 16 prescriptions were oversupplied to Cobb 17 County from 1999 to 2021, correct? 18 That's not in the report? 19 A. What is in the report is an 20 analysis of the epidemiological 21 literature that provide those numerical 22 ranges. 23 Q. Well, I understand -- 24 A. But it is not in Schedule A</p>

<p style="text-align: right;">Page 230</p> <p>1 and did I not produce a spreadsheet. 2 Q. And you didn't do a specific 3 calculation or give a specific number in 4 your report, correct -- 5 MS. do AMARAL: Objection. 6 Q. -- for Cobb County? 7 A. I did do a specific analysis. 8 Q. I didn't ask you specific 9 analysis; very simple yes or no. 10 Is there a number in your report of 11 the number of opioids that you believe 12 were oversupplied in Cobb County between 13 1999 and 2021? 14 MS. do AMARAL: Objection, 15 asked and answered and vague. 16 Q. Is there a number? 17 MS. do AMARAL: Same 18 objection. 19 A. In my general report, I 20 provide an analysis of the epidemiological 21 literature that provides numerical 22 estimates of oversupply and that is what 23 I used to form my opinion. And that 24 contains data that is specific to Cobb</p>	<p style="text-align: right;">Page 232</p> <p>1 A. Yes. 2 Q. Okay. So, in your general 3 report, you cite a few articles that were 4 published in that journal. And I wanted 5 to ask you a couple of questions about 6 them. That means I need a sticker or 7 two. 8 MR. ESSIG: What number are 9 we on number-wise? 10 Eight. 11 (Deposition Exhibit Keyes 8, 12 article entitled, "Predicting 13 first use of heroin from 14 prescription opioid use subtypes: 15 Insights fro the Monitoring the 16 Future longitudinal panel," 17 authored by Dash, et al, was 18 marked for identification.) 19 Q. Alright. I'd like to hand 20 you what we've marked as Keyes 8 to your 21 deposition. 22 This is the 2024 Dash report that I 23 think you mentioned before. 24 Do you recall this article?</p>
<p style="text-align: right;">Page 231</p> <p>1 County. 2 Q. But a number itself is not 3 supplied in Schedule A, yes or no? 4 MS. do AMARAL: Same 5 objection. 6 A. Because I did the analysis in 7 the general report, I did not need to 8 include any specific numbers in Schedule 9 A to form my opinion. 10 Q. Professor Keyes, you are an 11 associate editor, I believe, with the 12 Journal of Drug and Alcohol Dependence; 13 is that right? 14 A. Yes. 15 Q. And what is your role there 16 as an Assistant Editor? 17 A. I evaluate studies that have 18 been submitted by scientists and I judge 19 their appropriateness for peer review and 20 their appropriateness for the scope of 21 the journal. 22 Q. So do you have a role in 23 approving which manuscripts get published 24 in that journal?</p>	<p style="text-align: right;">Page 233</p> <p>1 A. Yes, I do. 2 Q. And did you have any role in 3 reviewing or selecting this paper for 4 publication? 5 A. No. 6 Q. How many associate editors 7 are there of Drug and Alcohol Dependence? 8 A. I'm not sure. 9 Q. Handful, dozens? Do you have 10 any idea? 11 A. It's publically available on 12 the website. If I were to make a 13 ballpark guess, I would say probably 15. 14 But I could be -- there's a margin of 15 error there. 16 Q. And are articles for review 17 assigned, you know, based on particular 18 areas of interest or randomly? Or how 19 does that work in terms of what articles 20 you get to look at? 21 A. The associate editors each 22 have content errors that they cover. 23 Q. What are your "content areas"? 24 A. I would need to look on the</p>

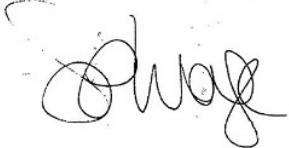
<p style="text-align: right;">Page 234</p> <p>1 website with -- I'm not sure exactly 2 what's listed on the website, in terms of 3 my content areas. 4 Q. Are opioid-related articles 5 part of your content areas? 6 A. I don't know that my content 7 area specified opioid-related articles. 8 Epidemiology is the -- would be a content 9 area that I cover. 10 Q. So the Dash article is in 11 front of you. It's a 2024 article in a 12 Drug and Alcohol Dependence. It's 13 titled, "Predicting first use of heroin 14 from prescription opioid use subtypes: 15 Insights from the monitoring the future 16 longitudinal panel." And the lead author 17 is a Genevieve F. Dash. 18 Do you see that? 19 A. I do. 20 Q. Are you familiar with Dr. 21 Dash? 22 A. I'm not. 23 Q. You cite this article on 24 Page 42 of your general Track 8 report?</p>	<p style="text-align: right;">Page 236</p> <p>1 A. Yes. 2 Q. Okay. And -- but, in their 3 abstract, the authorized -- the authors 4 summarized their conclusion in the 5 conclusion section of the abstract to say 6 in the first line, "NUPO does not 7 uniformly or uniquely increase risk for 8 heroin initiation." 9 Do you see that? 10 A. I see that -- 11 MS. do AMARAL: Objection, 12 vague. 13 A. I see that that is what is 14 written. 15 Q. Okay. Do you agree or 16 disagree with that sentence? 17 A. I think my analysis of their 18 paper -- and if you look at their 19 results, what they show is strong and 20 significant associations with subsequent 21 heroin use in the majority of student 22 respondents who used opioids nonmedically 23 in their paper. 24 Q. And you didn't report on</p>
<p style="text-align: right;">Page 235</p> <p>1 A. Yes. 2 Q. Okay. And I wanted to discuss 3 a couple of items here. 4 The abstract to the article begins 5 with, "Only a small proportion of 6 individuals who initiate nonmedical use 7 of prescription opioids (NUPO) transition 8 to heroin, suggesting that more nuanced 9 aspects of NUPO may be better indicators 10 of risk for escalating opioid use 11 trajectories." 12 Did I read that correctly? 13 A. Yes. 14 Q. Okay. And your discussion on 15 Page 42 in the generic section of your 16 report in Track 8 -- and I'm not going to 17 read the whole paragraph, but I think the 18 last line here maybe this is your 19 takeaway. You wrote, "Thus strong and 20 significant associations with subsequent 21 heroin use are found in the majority of 22 student responders who use opioid 23 nonmedical." 24 Did I read that accurately?</p>	<p style="text-align: right;">Page 237</p> <p>1 their finding that nonmedical users of 2 prescription opioids with the highest 3 rate of later heroin initiation have also 4 the highest rates of other illegal drug 5 use, correct? 6 A. I'm sorry. I don't understand 7 the question. 8 Q. Okay. You gave us your read 9 of the Dash article. And I'm just trying 10 to make the point that in your discussion 11 on Page 42 of the article, there's a 12 section of the article -- well, they 13 report on their findings that "nonmedical 14 users of prescription opioids with the 15 highest rate of later heroin initiation 16 are those who have the highest rates of 17 other illegal drug use." 18 Do you recall that from the Dash 19 articles? 20 A. That's one of the many 21 findings from the Dash article, but it 22 was not particularly relevant to the 23 comparison I was making. 24 Q. Okay. And do you recall --</p>

<p style="text-align: right;">Page 238</p> <p>1 and we can find it here -- that Dash and 2 her co-authors concluded that for those 3 users, quote, "It is likely more 4 reflective of a general propensity for 5 drug use and the course of addiction that 6 substantiation that NUPO acts as a 7 gateway to heroin use." 8 Do you see that? 9 A. That was not a finding from 10 their analysis. 11 That is a conclusion that they 12 drew, based on their interpretation of 13 the data. I would not agree with that 14 interpretation of the data. 15 Q. And why not? 16 A. Because much like every other 17 study that I cite in this section, they 18 find that there is strong and significant 19 associations with subsequent heroin use 20 found in the majority of student 21 respondents who used opioids not 22 medically. I think this article is very 23 consistent with the epidemiological 24 literature showing that one of the</p>	<p style="text-align: right;">Page 240</p> <p>1 death: Statewide analysis," and the lead 2 author is Benjamin Howell. 3 And this is cited on Page 70 of 4 your generic report. It's referenced at 5 241. 6 Were you involved in editing or 7 selecting or approving this article for 8 publication in the Drug and Alcohol 9 Dependence? 10 A. No. 11 I'm sorry, Page 70? 12 Q. I'm sorry. That's not the 13 right page. 14 MS. do AMARAL: It is if 15 you're referring to the references. 16 A. Oh, the reference is 241 on 17 Page 17. 18 (INAUDIBLE DUE TO CROSS-TALK.) 19 MR. ESSIG: Okay. 20 A. I just want to see where it's 21 discussed in the report before -- 241 is 22 the... 23 Q. Yes. 24 MS. do AMARAL: Yes.</p>
<p style="text-align: right;">Page 239</p> <p>1 biggest risk risks for use of heroin is 2 prior exposure to prescription opioids. 3 Q. Okay. Thank you. 4 MR. ESSIG: How much more 5 time? 6 THE VIDEOGRAPHER: 3:55. 7 MR. ESSIG: Five minutes. 8 Q. Dr. Keyes, I'd like to hand 9 you what we've marked as Exhibit Keyes 9 10 to your deposition. 11 (Deposition Exhibit Keyes 12 9, article entitled, "Concordance 13 between controlled substance 14 receipt and post-mortem toxicology 15 in opioid-detected overdose 16 deaths: A statewide analysis," 17 authored by Howell, et al., was 18 marked for identification.) 19 Q. This is another article from 20 the Journal of Drug and Alcohol 21 Dependence. This one is from 2023 22 called, "Concordance between controlled 23 substance receipt and postmortem 24 toxicology opioid detected overdose</p>	<p style="text-align: right;">Page 241</p> <p>1 A. Hold on. 241, okay. 2 (The witness writes on the 3 exhibit.) 4 MS. do AMARAL: And you see 5 it on Page 45? 6 THE WITNESS: Yes, I've got 7 it. 8 Q. Page 44 and 45. 9 A. Yes. 10 Q. Are you personally familiar 11 with Dr. Howell or any of the other 12 co-authors of this piece? 13 A. No, none of them sound 14 familiar to me. 15 Q. Okay. And you cited this 16 article in support of your assertion that 17 prior prescription opioid use among those 18 who die of overdose remain substantial 19 and significant, correct? 20 A. It is cited with the 21 statement that the percentage of 22 decedents with purported medically 23 prescribed opioids from the range of one 24 month to two years prior to death is,</p>

<p style="text-align: right;">Page 242</p> <p>1 approximately, 25 to 55 percent.</p> <p>2 Q. And you -- strike that.</p> <p>3 The authors here in the abstract,</p> <p>4 they discuss that this -- they examine</p> <p>5 data from 1,412 opioid detected overdose</p> <p>6 deaths in Connecticut from May of 2016</p> <p>7 through December of 2017.</p> <p>8 Do you see that?</p> <p>9 A. I do.</p> <p>10 Q. And they found that</p> <p>11 36 percent of the subjects had received</p> <p>12 an opioid prescription in the 90 days</p> <p>13 prior to their deaths.</p> <p>14 A. Well, 47 percent received</p> <p>15 opioid or benzodiazepine. 30 percent</p> <p>16 received opioid, yes.</p> <p>17 Q. 36 percent received an opioid,</p> <p>18 correct?</p> <p>19 A. Yes.</p> <p>20 Q. Okay. And...</p> <p>21 Let me get the right cite for you</p> <p>22 here.</p> <p>23 But they found that 84.5 percent of</p> <p>24 the deaths in this group were determined</p>	<p style="text-align: right;">Page 244</p> <p>1 Q. And why did you decide to add</p> <p>2 these new sections on fentanyl and</p> <p>3 stimulants to your generic report in</p> <p>4 Track 8?</p> <p>5 MS. do AMARAL: Objection,</p> <p>6 asked and answered.</p> <p>7 Go ahead.</p> <p>8 A. As I stated before, because</p> <p>9 we know that fentanyl deaths have been</p> <p>10 increasing and there is a lot of</p> <p>11 discussion about the role of fentanyl</p> <p>12 deaths in the opioid epidemic. So I</p> <p>13 thought that the availability over time</p> <p>14 of new epidemiological research warranted</p> <p>15 a special section or a new section.</p> <p>16 Q. And in fact on Page 51, your</p> <p>17 discussion notes that fentanyl has become</p> <p>18 a preferred product for users now in the</p> <p>19 current wave of the opioid crisis</p> <p>20 correct?</p> <p>21 MS. do AMARAL: Objection,</p> <p>22 asked and answered.</p> <p>23 A. Can you point me to where</p> <p>24 that is?</p>
<p style="text-align: right;">Page 243</p> <p>1 to be fentanyl or heroin involved.</p> <p>2 That's on Page 3 in "Results" in the</p> <p>3 second paragraph. The sentence that</p> <p>4 begins, "Based on toxicology results from</p> <p>5 OCME investigations were all opioid</p> <p>6 detected overdose deaths. Of 1,983,</p> <p>7 84.5 percent were fentanyl or heroin</p> <p>8 involved.</p> <p>9 Do you see that?</p> <p>10 A. And 42 percent involved a</p> <p>11 pharmaceutical opioid.</p> <p>12 Q. That's only 42 percent were</p> <p>13 found to have a pharmaceutical opioid</p> <p>14 detected in their system after death; is</p> <p>15 that right?</p> <p>16 A. Yes.</p> <p>17 Q. Okay. Then on Page 7...</p> <p>18 actually, strike that.</p> <p>19 Okay. Alright. Your generic</p> <p>20 report Pages 50 through 54, these are two</p> <p>21 new sections that you, also, had added in</p> <p>22 this Track 8 on fentanyl and stimulants;</p> <p>23 is that right? They were not in Track 7?</p> <p>24 A. Correct.</p>	<p style="text-align: right;">Page 245</p> <p>1 The preferred products?</p> <p>2 Q. So you cite a study from</p> <p>3 Baltimore, Maryland from November 17th,</p> <p>4 individuals for fentanyl.</p> <p>5 And then if you go down to the --</p> <p>6 A. I think, I found the</p> <p>7 sentence, and it's among people who use</p> <p>8 opioids over time. There has been an</p> <p>9 increase in the preference for fentanyl</p> <p>10 given the strength.</p> <p>11 Q. There Is an increasing</p> <p>12 preference for fentanyl among opioid drug</p> <p>13 users, correct?</p> <p>14 A. That's not what's written.</p> <p>15 MS. do AMARAL: Objection.</p> <p>16 A. What's written is, "As</p> <p>17 fentanyl became more familiar to people</p> <p>18 who use opioids, there was an increase in</p> <p>19 the proportion of opioid users who</p> <p>20 intentionally fentanyl as a preferred</p> <p>21 product," not the preferred product.</p> <p>22 MS. do AMARAL: Counsel, I</p> <p>23 believe you are out of time.</p> <p>24 MR. ESSIG: How much time</p>

<p style="text-align: right;">Page 246</p> <p>1 is left?</p> <p>2 THE VIDEOGRAPHER: 4:02.</p> <p>3 MS. do AMARAL: You're out</p> <p>4 of time.</p> <p>5 MR. ESSIG: Alright.</p> <p>6 Q. Professor Keyes, I appreciate</p> <p>7 your time today.</p> <p>8 MR. ESSIG: And, Counsel, I</p> <p>9 appreciate your time.</p> <p>10 Just for the record, because</p> <p>11 we -- and I'm not reopening</p> <p>12 anything here. But because we</p> <p>13 didn't get the notes of her</p> <p>14 interviews, we have Dr. Gullledge</p> <p>15 and Miss Owens and Chief --</p> <p>16 THE STENOGRAPHER: Adams.</p> <p>17 MR. ESSIG: I'm forgetting his</p> <p>18 name.</p> <p>19 A. Adams.</p> <p>20 Q. "Adams," thank you.</p> <p>21 MR. ESSIG: You know, I know</p> <p>22 you're going to produce those to</p> <p>23 us. I don't anticipate necessarily</p> <p>24 that they would cause us to want</p>	<p style="text-align: right;">Page 248</p> <p>1 the notes from Dr. Keyes.</p> <p>2 We just simply wanted to</p> <p>3 note that the parties have agreed</p> <p>4 to four-hour combined deposition</p> <p>5 for Dr. Keyes.</p> <p>6 Defendants have expended</p> <p>7 their time and the deposition is</p> <p>8 closed.</p> <p>9 Thank you.</p> <p>10 MR. ESSIG: And, for the</p> <p>11 record, we understand your position.</p> <p>12 I don't know that we agree</p> <p>13 with it with regard to materials</p> <p>14 that we could not have asked her</p> <p>15 about today that weren't produced</p> <p>16 to us.</p> <p>17 So, when we get the notes, we</p> <p>18 will happily meet and confer with</p> <p>19 you as to whether any additional</p> <p>20 time will be requested or not.</p> <p>21 But subject to that, I</p> <p>22 understand that we have concluded</p> <p>23 for today.</p> <p>24 MS. do AMARAL: And to the</p>
<p style="text-align: right;">Page 247</p> <p>1 to make a request to you for extra</p> <p>2 time, but we can meet and confer</p> <p>3 on the record after we receive</p> <p>4 those documents.</p> <p>5 MR. PACK: And that would</p> <p>6 be the same for Tarrant County as</p> <p>7 well.</p> <p>8 MS. do AMARAL: Understood.</p> <p>9 We're going to go off the</p> <p>10 record for just a moment and</p> <p>11 we're not going to close out the</p> <p>12 deposition just yet.</p> <p>13 Just give us one moment.</p> <p>14 THE VIDEOGRAPHER: Okay. We</p> <p>15 are off the record. The time is</p> <p>16 2:34 p.m.</p> <p>17 (Recess taken 2:34 to</p> <p>18 p.m.)</p> <p>19 THE VIDEOGRAPHER: We are</p> <p>20 back on the record. The time is</p> <p>21 2:39 p.m.</p> <p>22 MS. do AMARAL: Thank you,</p> <p>23 Counsel.</p> <p>24 We have no problem producing</p>	<p style="text-align: right;">Page 249</p> <p>1 extent that you could have requested</p> <p>2 those documents in advance, it</p> <p>3 would be our position that there</p> <p>4 wouldn't be additional time. But</p> <p>5 we can meet and confer, as you</p> <p>6 suggest.</p> <p>7 MR. ESSIG: Fair enough.</p> <p>8 MS. do AMARAL: Okay.</p> <p>9 MR. ESSIG: Alright.</p> <p>10 THE VIDEOGRAPHER: We are</p> <p>11 off the record. The time is</p> <p>12 p.m. This concludes today's</p> <p>13 testimony.</p> <p>14 Thank you everyone. And</p> <p>15 take care.</p> <p>16 (Time noted 2:40 p.m.)</p> <p>17</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p>

Page 250

1 **CERTIFICATE OF REPORTER**
2 I, SILVIA P. WAGE, CSR, CRR, RPR,
3 hereby certify that the witness in the
4 foregoing deposition was by me duly sworn
5 to tell the whole truth, nothing but the
6 truth; said deposition was taken down in
7 shorthand by me, a disinterested person,
8 at the time and place therein stated. The
9 testimony of said witness was thereafter
10 reduced to typewriting by computer under
11 my direction and supervision. Before
12 completion of the deposition, review of
13 the transcript [X] was [] was not
14 requested. If requested, any changes
15 made by the deponent (and provided to
16 the reporter) during the period allowed
17 are appended hereto.
18 I further certify that I am not of
19 counsel or attorney for either or any
20 party to said deposition,
21 and in the event
22 I am not
23 liable therefor.
24  May 29, 2024

Page 251

1 Veritext Legal Solutions
2 1100 Superior Ave
3 Suite 1820
4 Cleveland, Ohio 44114
5 Phone: 216-523-1313
6 May 29, 2024
7 To: PAULINA do AMARAL
8 Case Name: National Prescription Opiate Litigation - Track 8 (Cobb
9 County) v.
10 Veritext Reference Number: 6692778
11 Witness: Katherine Keyes, Ph.D. Deposition Date: 5/14/2024
12 Dear Sir/Madam:
13 Enclosed please find a deposition transcript. Please have the witness
14 review the transcript and note any changes or corrections on the
15 included errata sheet, indicating the page, line number, change, and
16 the reason for the change. Have the witness' signature notarized and
17 forward the completed page(s) back to us at the Production address
18 shown
19 above, or email to production-midwest@veritext.com.
20 If the errata is not returned within thirty days of your receipt of
21 this letter, the reading and signing will be deemed waived.
22 Sincerely,
23 Production Department
24 NO NOTARY REQUIRED IN CA

Page 252

1 **DEPOSITION REVIEW**
2 **CERTIFICATION OF WITNESS**
3 ASSIGNMENT REFERENCE NO: 6692778
4 CASE NAME: National Prescription Opiate Litigation - Track 8
5 (Cobb County) v.
6 DATE OF DEPOSITION: 5/14/2024
7 WITNESS' NAME: Katherine Keyes, Ph.D.
8 In accordance with the Rules of Civil
9 Procedure, I have read the entire transcript of
10 my testimony or it has been read to me.
11 I have made no changes to the testimony
12 as transcribed by the court reporter.
13 _____
14 Date Katherine Keyes, Ph.D.
15 Sworn to and subscribed before me, a
16 Notary Public in and for the State and County,
17 the referenced witness did personally appear
18 and acknowledge that:
19 _____
20 They have read the transcript;
21 They signed the foregoing Sworn
22 Statement; and
23 Their execution of this Statement is of
24 their free act and deed.
25 I have affixed my name and official seal
26 this _____ day of _____, 20____.

Page 253

1 **DEPOSITION REVIEW**
2 **CERTIFICATION OF WITNESS**
3 ASSIGNMENT REFERENCE NO: 6692778
4 CASE NAME: National Prescription Opiate Litigation - Track 8
5 (Cobb County) v.
6 DATE OF DEPOSITION: 5/14/2024
7 WITNESS' NAME: Katherine Keyes, Ph.D.
8 In accordance with the Rules of Civil
9 Procedure, I have read the entire transcript of
10 my testimony or it has been read to me.
11 I have listed my changes on the attached
12 Errata Sheet, listing page and line numbers as
13 well as the reason(s) for the change(s).
14 I request that these changes be entered
15 as part of the record of my testimony.
16 I have executed the Errata Sheet, as well
17 as this Certificate, and request and authorize
18 that both be appended to the transcript of my
19 testimony and be incorporated therein.
20 _____
21 Date Katherine Keyes, Ph.D.
22 Sworn to and subscribed before me, a
23 Notary Public in and for the State and County,
24 the referenced witness did personally appear
25 and acknowledge that:
26 They have read the transcript;
27 They have listed all of their corrections
28 in the appended Errata Sheet;
29 They signed the foregoing Sworn
30 Statement; and
31 Their execution of this Statement is of
32 their free act and deed.
33 I have affixed my name and official seal
34 this _____ day of _____, 20____.

1	ERRATA SHEET
2	VERITEXT LEGAL SOLUTIONS MIDWEST
3	ASSIGNMENT NO: 6692778
4	PAGE/LINE(S) / CHANGE /REASON
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	Date Katherine Keyes, Ph.D.
21	SUBSCRIBED AND SWORN TO BEFORE ME THIS
22	DAY OF _____, 20_____.
23	
24	Notary Public
25	Commission Expiration Date